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FLYING

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JULY

50¢

PILOT REPORTS

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USAF's Compact Jet Shows Corporate Capabilities

PIPER'S FOUR-PLACE CHEROKEE:

A New Low-Cost All-Metal Airplane

KAMAN'S H-43B HUSKIE:

Rotary-Wing Safety For Jet-Age Airports

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FROM 300,000 PILOTS:

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Flight Hazards Of Lightning

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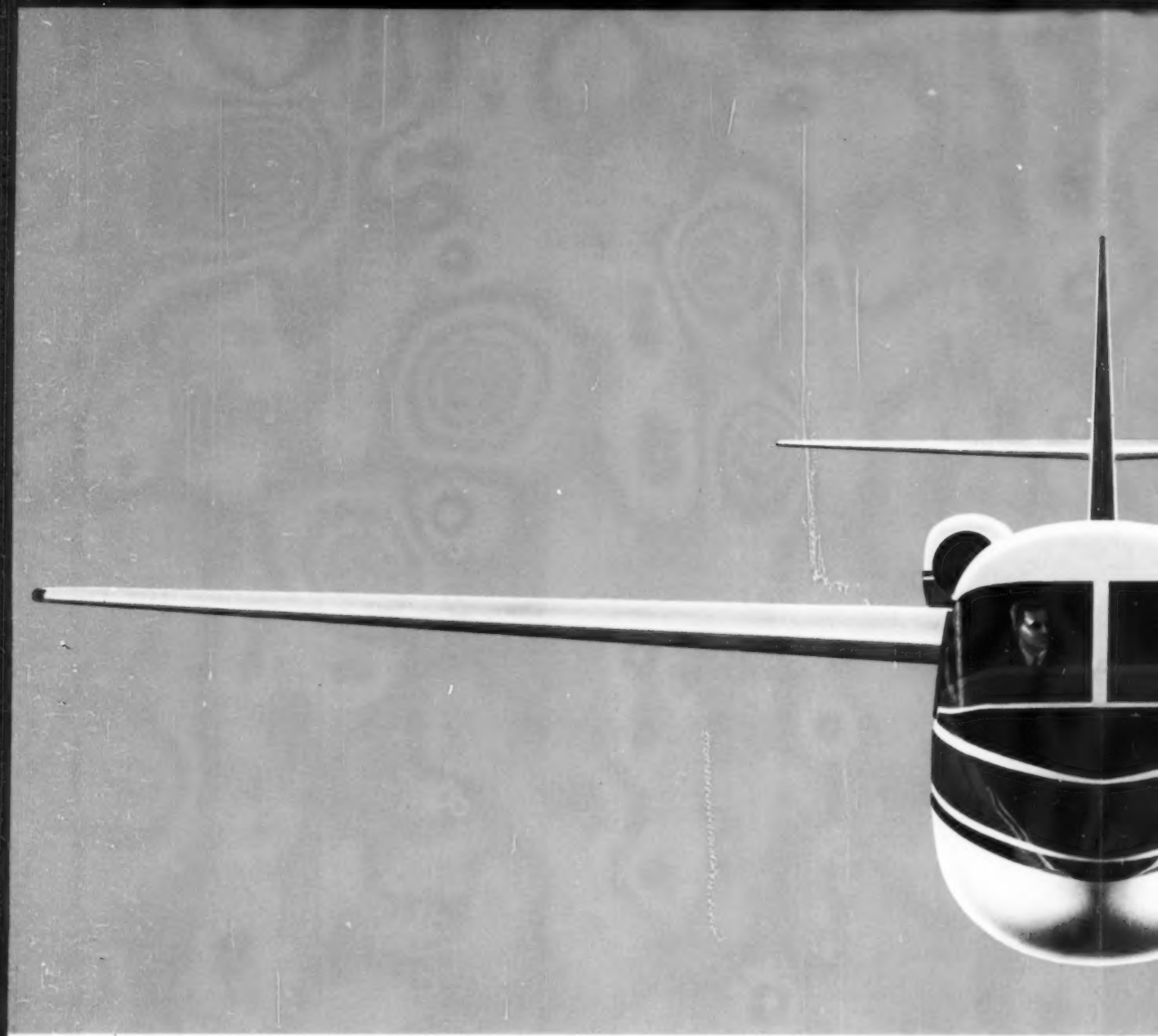

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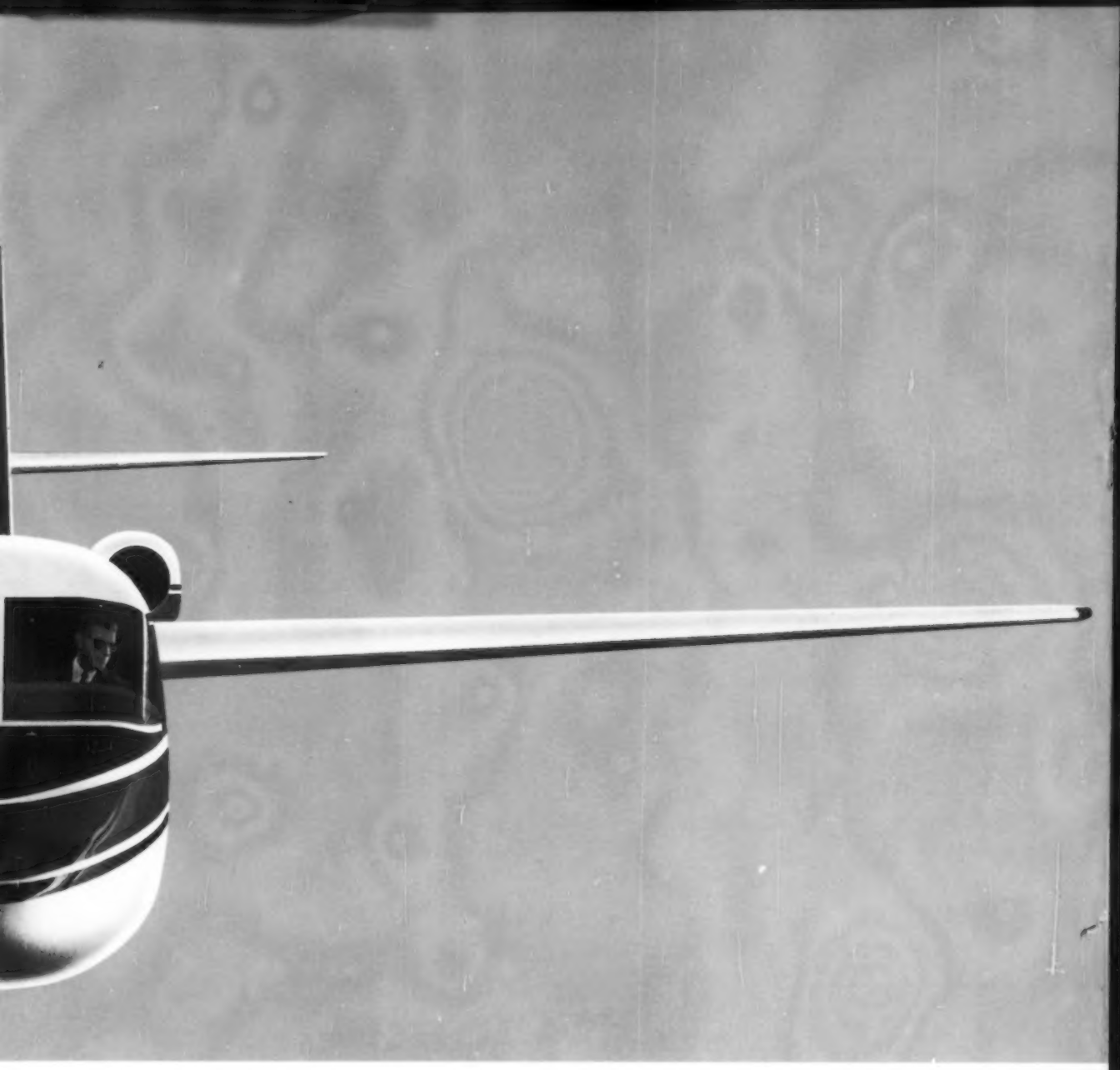

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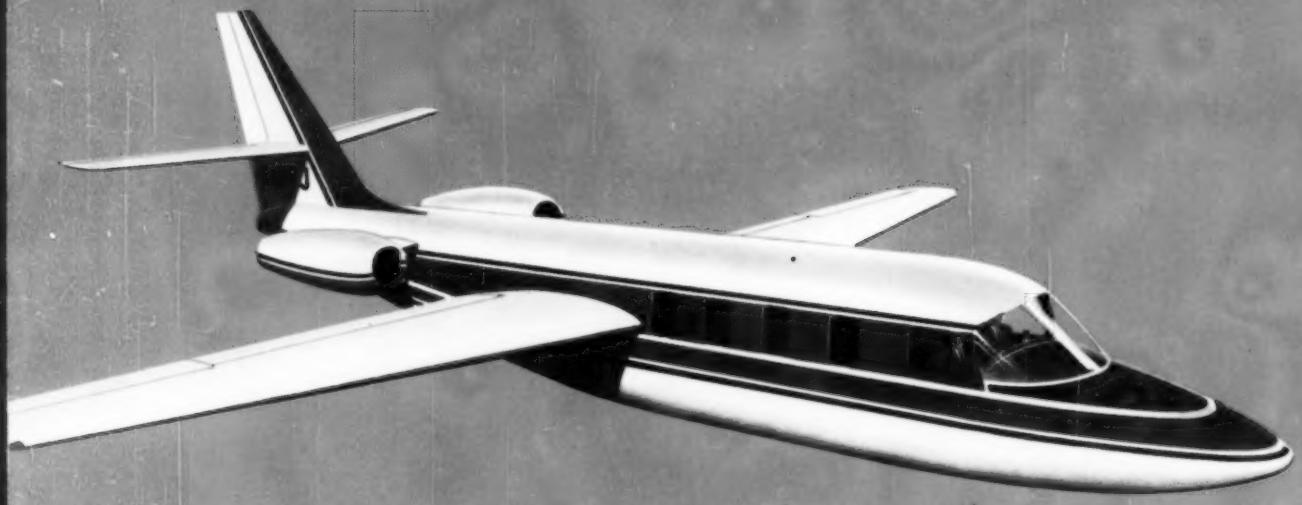

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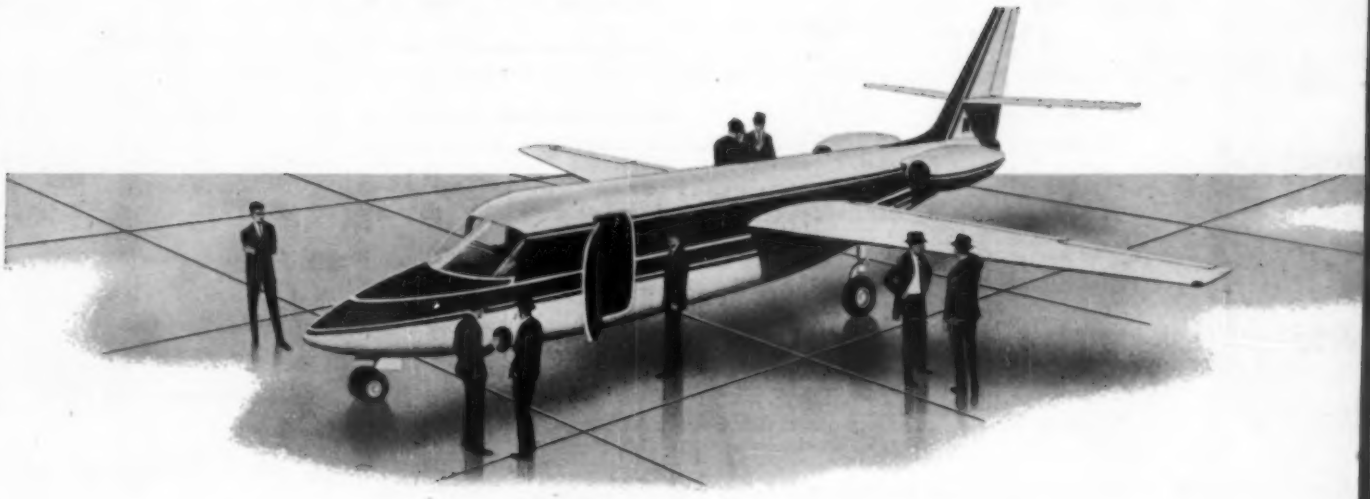

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JULY, 1961

VOLUME 69, NUMBER 1

COVER: Piper's Cherokee 160, subject of the pilot report on page 34, cruises in the late afternoon sunlight above the Atlantic off the coast of Florida. The easy-to-fly airplane, built at the company's Vero Beach, Fla., plant, has a high cruise of 132 mph at 7,000 ft. (Photo by Anthony Linck.)

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NEXT MONTH finds FLYING exploring anew the theme of operational safety, this time with the slant on developments in aircraft collision avoidance. Also to come is a close look at the civilian program that depends upon single-engine IFR operation (see adjoining column). Also—photos and details of aircraft displayed at the Paris Air Show.

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WINGS and THINGS

EMERGENCY TALKDOWN PROCEDURES for non-instrument pilots caught on top of overcast have been distributed to air traffic control operators. Talkdowns aim at safe descent through instrument conditions without loss of aircraft control. FAA has made no tests of VFR-pilot ability properly to follow instructions when flying alone through actual IFR conditions; stresses that talkdown is strictly a last-resort maneuver.

LIGHTWEIGHT "RESCUE" TRANSMITTER *expected to be marketed this month by Lake Aircraft Corp., Sanford, Me. Small transistor transmitter is portable, water-tight, and self-contained. It will operate automatically on aircraft impact, or manually, and transmit for 36 hours on 121.5 (the international emergency frequency). Cost will approximate $200.*

SINGLE-ENGINE IFR is stressed and flown regularly by Army pilots attending the service's instrument training school at Ft. Sill, Okla. Aircraft utilized are Piper Comanche 250s; civilian contract school is operated by Ross Aviation of Tulsa, Okla. Classes are of eight weeks duration during which Ross-trained students receive 40 hours each of Link, 90 hours of academic instruction and 70 hours each in the Comanche. Aircraft, utilizing Aircraft Radio Corp. nav/com equipment, are deliberately flown into actual IFR conditions and operate under Jeppesen manual minimums.

NEW PIPER COMANCHES *are in the mill. Piper's entry in the light-light twin category reportedly will be a twin-Comanche that will sell for less than $30,000 and cruise about 190 mph. Power will be supplied by two fuel-injected four-cylinder 155-hp Lycomings. Also in the works is a single-engine Comanche which would be powered by a new version of the Lycoming 0-580 flat eight-cylinder engine (formerly a helicopter powerplant) rated at 400 hp. at 3,300 rpm. Airplane would cruise at about 215 mph.*

ISRAEL AIRCRAFT INDUSTRY, whose Bedek B101C light twin turbo-jet is in the development stage, has discussed U.S. production with Piper, Beech, Cessna and Lockheed. The airplane reportedly would be produced here providing 60 firm orders could be guaranteed. The small, seven-place jet, which is programmed to fly 530 mph at 35,000 ft., will be powered by two aft-fuselage mounted General Electric CJ610s of 2,850 lb. thrust each (see FLYING for May). Range would approximate 2,000 miles; cost, about $400-500,000.

DO NOT FLY *beneath a blimp, warns the FAA. Airships operating over water, or adjacent to coastline, often are engaged in either towing sonar gear or picking up sea water for ballast. Hard-to-see cables extend from the airship to the water, endangering any aircraft that passes directly below.*

PORTABLE FM RADIOS BANNED on all civil aircraft, FAA directive states. Ruling follows tests which indicate radios with oscillators operating in or near the very-high-frequency band seem to affect aircraft instruments.

ZIFF-DAVIS PUBLISHING COMPANY, One Park Avenue, New York 16, N. Y. William B. Ziff, Chairman of the Board (1946-1953); William Ziff, President; W. Bradford Briggs, Executive Vice President; Herschel B. Sarbin, Vice President and General Manager; Michael Michaelson, Vice President and Circulation Director; M. T. Birmingham Jr., Vice President and Business Manager; Richard Kislik, Treasurer; Charles Housman, Financial Vice President.

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AIRLINE OF THE STARS

Part of NAL's new multimillion-dollar Overhaul and Maintenance facility, the first designed expressly for jet-age operations. It can handle six DC-8's at a time.

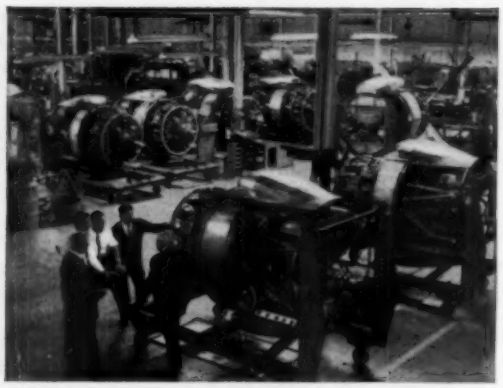
A behind-scenes report on National Airlines

by HERB FISHER

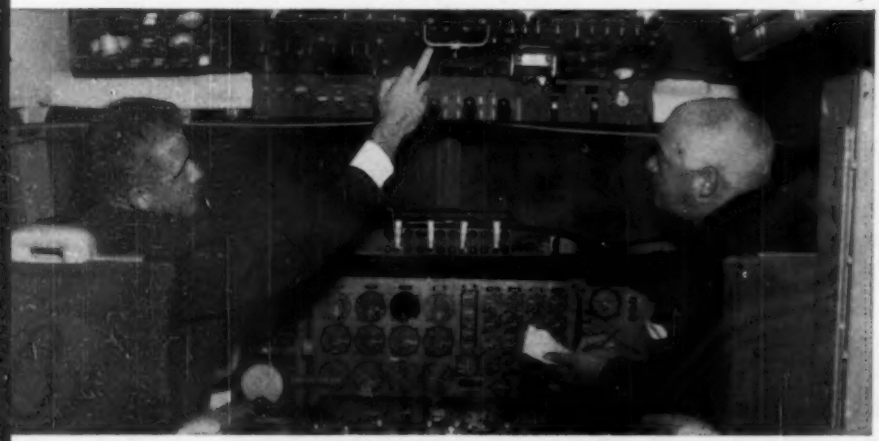
international aviation authority, veteran test pilot, author

Two four-place Ryan monoplanes, two eager pilots, a 150-mile route award—and National Airlines was on its way to the stars a quarter century ago.

Today, from an ultramodern, multi-million-dollar home base at Miami International Airport, National jets lace the hemisphere with high standards of public service. *National's route mileage was doubled a few weeks ago when the CAB awarded the airline a coast-to-coast route —Florida to San Francisco/Oakland via Las Vegas, and Los Angeles/Long Beach via San Diego.*



Inspecting Champion-equipped reciprocating engines and jet turbines in NAL overhaul—Doug Shropshire, Champion; R. J. Pierce, Manager, NAL Engine Overhaul; J. M. Wolgast, Director, Maintenance & Engineering; Warren Schuling, Director, Line Maintenance; and Fisher.



Lewis W. Dymond, Vice President-Operations, shows Fisher one of NAL's new Flight Simulators, an electronic mock-up governed by a roomful of computers outside . . . computers that hydraulically pitch and roll the cockpit and simulate in detailed realism *every flying condition* —thunderstorms, radio malfunctions, even engine fires. NAL conducts jet Flight Simulator courses for other airlines, too.

R. B. "Bob" Phillips, Director of Training and designer of NAL's Ignition Analyzer . . . a device that shows what's going on in the ignition system under varying conditions.

"Listed assets total over $97 million and we employ about 4,500 people," Dymond tells Fisher. Standing is Chief Pilot Sam Stoia.

Fisher discusses jet operations with G. T. "Ted" Baker, NAL President and Board Chairman: "Our policy speaks for itself, Herb. We use *only the best* in operating techniques and parts and equipment."

Ramrodding the aggressive "Airline of the Stars" is its aggressive founder and first pilot, G. T. "Ted" Baker, President and Chairman of the Board. In a sense, you might say this dynamic individualist is a paradox: he's an unafraid "idea man" with a hard core of practicality. He'll study a situation intensely—then lift airline industry eyebrows with a pace-setting new program. Under his direction, National fought its way up from a fledgling regional carrier to a firmly entrenched major airline. National's move to the front ranks of the industry is rightly referred to as "phenomenal."

Inspired merchandising has netted National many profitable "firsts." Striving for jet leadership, NAL became the first airline in the nation to fly pure jets in commercial service—a Baker coup made possible by leasing Boeing 707's before NAL's DC-8's arrived. National's multimillion-dollar overhaul and maintenance facility at Miami—part of a $117,000,000 expansion program now being completed—is the first designed expressly for jet-age operations. One self-supporting, cantilevered structure can handle six DC-8's at a time.

In another pace-setting public service promotion, National pioneered low-cost coach flights, today operates more than half its long-haul carriers as economy coaches. The "Millionaire's Vacation on a Piggy Bank Budget" plan has brought thousands of off-season travelers to South Florida . . . in fact, more tourists during previously "dead" summer months than came during the entire year of 1954.

NAL pioneered aircraft interchange service with other airlines—to the West Coast, to points deep in South America. National was first with nonstop direct flights between New York and Miami (1946) . . . first with daylight coach service between New York and Florida . . . first with a scheduled helicopter service to nearby cities . . . among the first with several streamlining operations—such as system-wide electronic reservations equipment and Ignition Analyzer training devices, the latter designed and built by National Airlines.

As I toured the NAL-Miami complex —observing service on DC-8's, Electras and DC-7's—I was struck by the clean, efficient *precision* of NAL maintenance and overhaul. Here were top-calibre personnel employing top-calibre techniques and equipment in an operation epitomizing high standards of jet-age safety and service.

"Around here, we won't settle for anything less than the best," J. M. Wolgast, Director of Maintenance & Engineering, told me. "Every job and vital component is given careful attention. We want to use only the *tried-and-proven* best in parts and equipment. For instance, in these DC-8 engines, Herb, where you're developing over 15,000 pounds of thrust per engine and on *continuous ignition* up to 5,000 feet—we prefer to use Champion jet igniters."

As a matter of fact, from early-day Lodestars on up through jets, National has always used Champions.

"We've run tests on other igniters and plugs," Wolgast said, "but these tests just make us more certain we've got the *best* in *Champions*. The spark plug is *vital* to engine performance and dependability, you know—and our engines are fired by Champions because they're the *most dependable* spark plugs."

Flying the operational extremes of the subtropics, National should know. NAL flight schedules are tight, NAL downtime is minimal.

The "Airline of the Stars" is a high-precision, peak-performance outfit.

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THE SCHINE INN, Chicopee, Massachusetts

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WESTERN SKIES HOTEL, Albuquerque, N.M.

MAILBOX

CONTROL SURFACES

Your editorial "With a Great Price" of January 1961 has a message for other people than the American, and other types besides the unconcerned passenger.

Mathematical analysis has responsibilities in many areas. One of the things it teaches in the matter of flying now seems very clear and urgent.

Control surfaces in aircraft should be divorced from the stabilizing surfaces and placed at the front. For turns, a fin above the nose would produce an immediate response in the required direction. It would also set up the correct yaw and roll. The airframe stress would be reduced from the level imposed at present. . . . Control surfaces at the front would not fail in stalls and spins . . .

Logic seems inescapable that this modification should be utilized without delay.

A. J. MACINTYRE
Department of Mathematics
University of Cincinnati (Ohio)

FUEL INJECTION

We have read with interest the article on Fuel Injection (May issue). On page 83 our fuel injection (Airline Training, Inc., Supplemental Type Certificate SE1-391) is listed as applicable to the Conrad 9800 Twin Beach conversion. Our Fuel Injection FAA approvals include also Twin Beach standard D18S, standard C-45G series, standard E18S, E18S-9700, as well as the Conrad 9800-D and 9800-E. . . .

W. H. CONRAD, President
Airline Training Inc.
Ft. Lauderdale, Fla.

ALCOHOL ALOFT

It is with great interest that I read "The Thrust Lever" in April FLYING. All too often we see policy made, and changes implemented that are wholly contrary to the principles and wishes of our people.

This matter of serving alcoholic beverages on flights I, too, find to be potentially dangerous. But, not the least, I feel it to be a direct affront to the dignity of man!

My mother and father, both in their 70s, were occasioned through a death in the family to experience their first airplane trip. Their impressions of aviation were most favorable, but I'm afraid badly tarnished by the serving of alcohol aloft.

You may count on my support on legislation to remove this curse.

L. C. CHARLES MACK
Durand, Mich.

BENEFITS OF CAP

". . . Although the cost of learing to fly is rather steep, I'm determined to take flying lessons in about a year, when my 16th birthday comes around. As to advice to aviation-minded youth, a step in the right direction is to join the Civil Air Patrol. I have been in CAP for over a year, and it has opened a new world of facts and activities.

As a pilot told me after a flight, "Don't ever cease to hunt for new and educational material, for the day you stop learning is the day you quit."

DAVID F. BEINE
Milwaukee, Wis.

FIRST IN BRITAIN

Enclosed is a photograph which may be of interest to you as the aircraft is comparable in type and view to the one illustrated on the front inside cover advertisement in your March 1961 issue of FLYING.

The picture shows the first Beechcraft Queen Air to land at Manchester Airport, England, on 14th March 1961, and is reputed to be the first British-registered aircraft of this type in the country. The new

ATC tower and administrative offices, now nearing completion, are seen in the background.

My personal interest in aircraft and air traffic is mainly statistical, coupled with the fact that I am a long-service member of the British Royal Observers Corps, the duties of which entail the recognition of all types of aircraft in flight, and I find your magazine very instructive and interesting. And the cover illustrations really take one's eye.

JAMES W. WOOD
Manchester 22, England

VIVE LE VOLUME

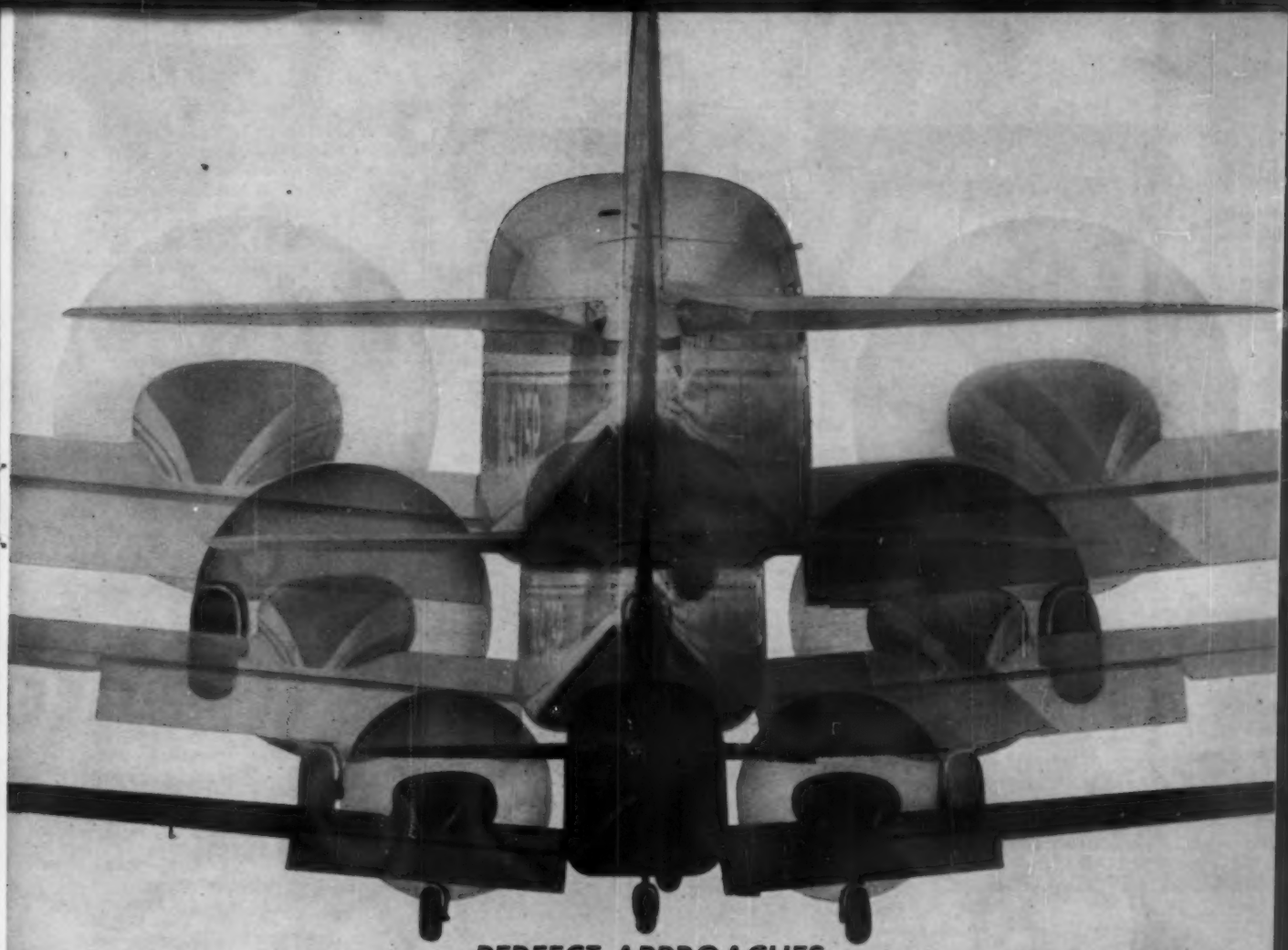
The recent letter from Mr. E. G. Edge, pertaining to the fixed base operator's plight has stirred up a fair amount of comment, and whether pro or con, that's all to the good. However, the letter in your May issue (Mailbox), from L. J. Davignon Jr., demonstrates all too clearly the general public's failure to get to the bottom of the problem.

First of all, I wish Mr. Davignon would direct me to the operator *anywhere* who manages to average four hours of utilization per aircraft per day at *any* price. And to assume that a one-third reduction in his rates would double that utilization is pure wishful thinking.

One of the best, cleanest, and most comprehensive Flight Schools I know of uses a fleet of Cessna 150s, and their top utilization runs about 100 hours per month, or 1,200 hours per year. At this figure their hourly cost per hour in the air works out to about $5.50, including insurance, gas, oil, reserve for maintenance, etc. With any less flying, this hourly cost mounts sharply, but increasing the utilization beyond 1,200 hours per year is impractical due to necessary down-time for overhaul, inspection and even gassing between flights. When this operator's average utilization gets beyond 1,200 hours per year per plane, it is necessary for him to add another plane. . . .

Then, according to Mr. D., all money over and above the operational cost of the aircraft and the instructor's hourly wage is listed as "net profit." What ever be-

(Continued on page 8)



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MAILBOX

(Continued from page 6)

comes of overhead? . . . rent, mechanics and office help, tie-down or hangar to say nothing of a large bite from taxes.

Mr. D.'s statement to the effect that an instructor would prefer to have more hours at a lower cost than fewer hours at a high rate is well taken. So valid is it, in fact, that many legitimate operators—to insure getting and keeping competent instructors—pay them a flat monthly wage. So now what happens to that poor operator when the weather socks the field in for a week at a time? The money is going out even if nothing is coming in. And doesn't Mr. D. know that regulation limits a flight instructor to 36 hours per week anyway?

The inevitable conclusion to all this, of course, is that if the cost of dual instruction is reduced to any extent and the hard-hearted operator stubbornly refuses to go out of business, there is only one place for the slack to be taken up . . . in the quality of the instruction itself . . .

It should be emblazoned in headlines that flying is not and cannot be taught by assemblyline methods. And a student's instruction cannot be limited only to flying time. A conservative estimate would be that a student gets an hour's "talk-time" on the ground for each hour in the air. A conscientious instructor does just this, but the operator charges only for flight time. His margin must be such that this is possible.

Mr. D. wants to lower the cost of learning to fly. Fine; a noble objective. But he's going to have to decide if the quality of the resulting low-cost product is going to be worth buying.

TOM BAXTER
Wade Air Service
Santa Monica Municipal Airport, Calif.

. . . It would be nice if one could schedule his operation to have someone waiting every hour for instruction. Most people have to work for a living, so they show up for lessons late evenings or weekends. This means more airplanes and instruction for the peak loads with airplanes and instructors idle during slow periods. All this costs money.

Also, instruction should be one of the more highly paid jobs in the aviation industry, but it so happens it is one of the saddest. Any instructor who flys 100 hours a month at $3 has had it. . . . If an instructor is any good, he is worth at least $5 per hour on airplanes from 65 hp to 230 hp . . . (and) anyone learning to fly should be willing to pay for good flight instruction. . . .

FRANK FRUGOLI, Proprietor
Sky Road Airport
High Springs, Fla.

. . . Unfortunately Mr. Davignon has apparently not secured . . . accurate information relative to the costs involved in the instruction of pilots. . . . He does not take into consideration real estate investment, taxes, building and property maintenance and many other costs. . . .

As far as his theory on volume goes, this has been tried, but unfortunately the volume does not spread out over the entire week . . . they still fly heavily on weekends and evening daylight hours so the end result is still the same number of hours for the year, or such a negligible increase in business that it would not offset the reduced rate.

THOMAS F. BARR, Manager
Clementon Aviation, Inc.
Clementon Airport, N. J.

. . . I have been closely associated with flying for 35 years and currently certificated for 32 consecutive years. Believe me, the trouble actually does not exist in the high cost of learning to fly. In many cases I find that it is only a mediocre desire, and the cost argument an escape path out. The old adage that "anything worth having is worth working for" still holds true and in a manner, this separates the men from the boys. . . .

KENNETH C. HOYT
Hoyt's Aircraft Service
Monroe, Mich.

SEEKING HELICOPTER DATA

I am engaged in writing an informal history of the helicopter to date. I am especially interested in securing photographs and brief descriptions of unusual or outstanding helicopter experiments. These need not have been successful commercially but may, in some cases, even appear to be oddities. . . .

RICHARD G. HUBLER
P.O. Box 793, Ojai, California

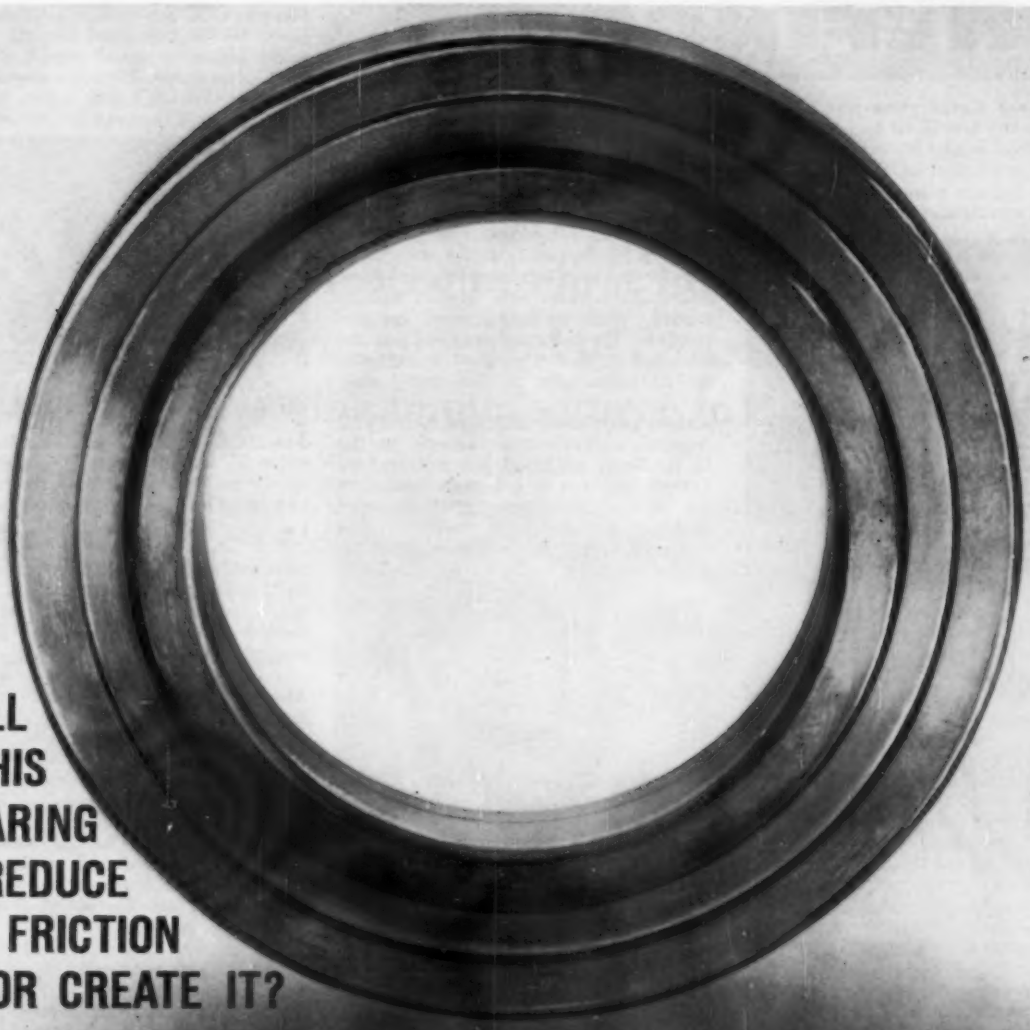
MODERN EQUIPMENT

Glancing through some old issues of FLYING (November 1960) I noticed an article on NAFEC (Test bed for Tomorrow). The location was described as "one of the best equipped airfields in the world." I respectfully suggest that the enclosed photograph should have been included with those of AGACS, Bell Automatic Landing System, Approach Light Configurations, etc.

Back in the '40s, at Newark the old CAA operated Radar from a trailer in the center of the airport. From April 1960 to the present, the Bureau of Air Traffic Management of the FAA operates a Radar unit from a generally similar type trailer . . . at NAFEC (now called Bureau of Research and Development—ED). As part of the effort to improve working conditions for Air Traffic Controllers, NAFEC built this beautiful "Men's Lounge" (no door) for the use of the personnel who staff the Radar (MPN-11) 16 hours out of each day. Newark never had this.

. . . I firmly believe that as another first, NAFEC can boast the only airport in the U. S. that provides an Out-House for the convenience of operational Air Traffic Controllers!

AIR CONTROLLER
(Name withheld upon request)
Atlantic City, N. J.



WILL THIS BEARING REDUCE FRICTION ...OR CREATE IT?

To the eye, differences between an *original equipment part* and a substitute are seldom apparent. But your engine quickly detects any flaw or deficiency.

Take bearings, for example. Their internal geometry is vitally important—and faulty geometry *creates* friction instead of reducing it. In addition, improperly contoured surfaces can cause uneven loading and result in bearing breakdown.

This propeller thrust bearing is a Pratt & Whitney Aircraft *original equipment part*. It will reduce friction. Its specifications are precise as to the components' material content, finish and measurements. The size of the ball elements, clearance of ball pockets in the cage, the groove radii of inner and outer races... all are minutely exact.

Constant research, testing, and refinement by both Pratt & Whitney Aircraft and the bearing manufacturers develop these strict aircraft engine standards of accuracy. Specialized equipment, precision processing, and demanding quality controls maintain them.

This is why you will find that the best way to ensure the dependability engineered into your Pratt & Whitney Aircraft engine is to make all replacements with *original equipment parts*. They are quickly available direct from Pratt & Whitney Aircraft, or its authorized distributors in the United States and Canada.

PRATT & WHITNEY AIRCRAFT
East Hartford, Connecticut

CANADIAN PRATT & WHITNEY AIRCRAFT CO., LTD.
Longueuil, P.Q., Canada

BRIEFINGS...

The Northrop Corporation was honored this year by the Arnold Air Society with the 1961 Fairchild trophy for design, development and production of the T-38 Talon supersonic training plane, and "other distinguished contributions" to the national

defense effort. The highly prized award was officially presented to Northrop's president, Thomas V. Jones (*left*) at the Society's annual conclave in Detroit, by General Frank Everest, commander of the Tactical Air Command.

A "boom" in the use of small, non-commercial aircraft over the next 10 years is forecast by the Aerospace Industries Assn. (AIA). A recent survey by AIA's Utility Airplane Council indicated that by 1970 an estimated 100,000 general aviation category aircraft will be in active operation in the nation, compared with the current 70,000. Attrition and obsolescence of aircraft are important factors in the 100,000 projection coupled with the fact that today only 12 per cent of the country's 3,000 industrial firms fly their own aircraft.

Record Breakers receive "Deplomes de Record" awards from the Federation Aeronautique International (FAI) as honored guests of the Aero Club of Washington, D.C. Vice Admiral Robert B. Pirie, Deputy Chief of Naval Operations made the presentation in behalf of NAA. The winners (*left to right*) Cmdr. Leroy A. Heath, for a world class record of 91,450.8 feet altitude, in a North American A3J-1; Lt. Henry

L. Monroe, navigator on Heath's altitude flight; Cmdr. John F. Davis, world 100-kilometer, closed-course speed record of 1,390.24 mph in McDonnell F4H-1, with Edward W. Virgin, the Club's president. Marine Lt. Col. Thomas H. Miller, received his award in absentia. He set a 500-kilometer closed-course world class record of 1,216.766 mph in the McDonnell F4H-1.

Forecasting the nation's airport needs over the next five years, FAA administrator N. E. Halaby, in a recent report to Congress, listed a total of 465 new airports needed, and improvements at 2,834 existing airports. The estimate, submitted by the Agency's National Airport Plan for 1961, lists city by city and state by state those airports requiring improvements and those communities where new airports will be needed. While no federal funds are provided by the National Airport Plan, the total cost of such a program is estimated at $1.1 billion over the five year period.

Sixteen years after delivering its first P2V Neptune anti-submarine aircraft to the U. S. Navy, Lockheed has delivered its 1,000th Neptune, in a seventh version, to the Navy. The original P2V weighed 55,000 pounds on takeoff; the P2V-7, 80,000 pounds. The original horsepower totaled 4,600; today's model, 7,500 plus 6,800

pounds of jet thrust; and the aircraft's electronic search and detection gear has jumped from 1,500 to 5,500 pounds. In 1946, a year after first deliveries, the "Truculent Turtle", a P2V-1, set a world's distance record unbeaten to this day; 11,236 non-stop, non-refueled, statute miles from Perth, Australia to Columbus, Ohio.

Sanderson Films, Inc., of Wichita, Kan., developers of the Sanderson Audio-Visual Ground School Course for Private Pilots (see FLYING, Feb. 1961, "New Approach in Ground Course Training" by Norman Jacobshagen), won three awards at the recent National Audio-Visual Competition in New York. First prize went to the firm for its radio navigation course, featuring the NARCO II radio; second for its flight computer course, and a special merit award for its demonstration film, a sales tool designed for the flight operator.

Two new Lycoming fuel injection engines, the IO-360-B1A, rated at 180 hp, and the 350-hp IGO-540-B1A, have been certificated by FAA. IGO-540 is the third version of the Lycoming fuel injection "540" series to be announced. The other two are a direct drive model, and a geared and supercharged model. The geared IGO-540 incorporates a Bendix RS10ED2 fuel injector. Its first application will be on the Aero Commander 680F. The IO-360 incorporates a Simmonds sytem, and its first application is the Beech Travel Air.

FAA has eased its eye standards for airline and commercial pilots. Details in Amendment 4 to Part 29 CARS, now in effect.

Sikorsky's GE-powered twin-turbine U. S. Navy HSS-2 helicopter claimed a new world helicopter speed record of 192.9 mph, over a three-kilometer course (1.86 miles) at Windsor Locks, Conn., May 17. A week later it captured the 100-kilometer

(62-mile) closed circuit helicopter speed record at 174.9 mph. Both records were previously held by a USSR Mil-6 helicopter and set in 1959 at speeds of 166.5 mph and 167.09 mph, respectively. Both records were set by Navy pilots, Cmdr. Patrick L. Sullivan (*left*) with Lt. Beverly W. Witherspoon, copilot of the Naval Air Test Center, Patuxent River, Md. in the same aircraft—a standard HSS-2.

Beech Aircraft has entered into an agreement with Brittain Industries, Hawthorne, Calif., to market internationally, under its own trade name, Brittain's adaptive inexpensive auto pilot, manufactured to Beech requirements, for lightplanes, and Brittain's 20-gallon auxiliary wing tip tanks built to Beech specifications for the Bonanza and Debonair business aircraft. A list price of $1,190 per pair has been set for the tip tanks, but no price announced, at this writing, for the auto pilot.

Six of the nine twin-engine Piper Apaches ordered by the College of Air Training, Hamble, England, to train future pilots for BOAC and other English airlines are lined up on Britain's sod after transatlantic flight

from Lock Haven, Pa., via Boston, Gander and the Azores. The crews (*left to right*): Walter Sawchuk, Howard Gregory, Miss Bobby Prestas, Ken Anderson; Mrs. Atalanta Fairey, Gene Locke, Bill Curtis, Walt Moody, Bob Kuehnle, Ray Townsend and W. T. Piper Jr. Miss Prestas, and Mrs. Fairey, both licensed pilots, flew as copilots. Mrs. Fairey is the widow of Richard Fairey of the Fairey Aircraft Co. of England.

On July 1, FAA, in cooperation with the U. S. Weather Bureau, will launch a year-

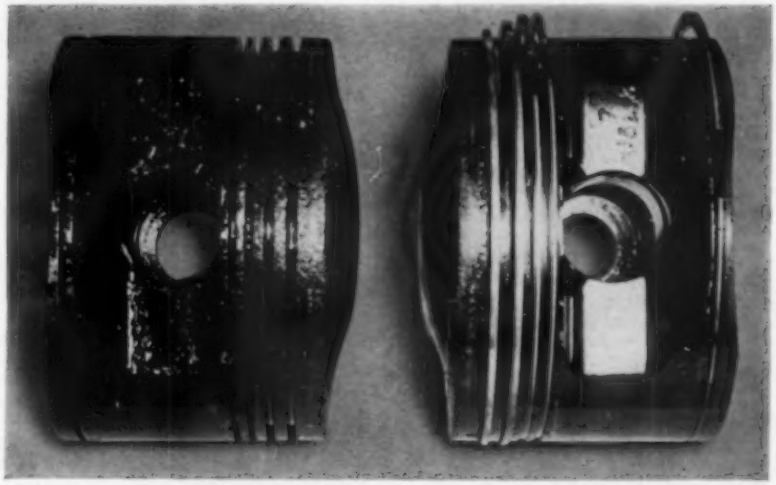
(Continued on page 104)

BULLETIN:

AeroShell Oil W becomes first fully compounded additive oil to win approval of every major aircraft piston engine manufacturer in the U.S.

Aircraft, large and small, have logged millions of flight hours on Shell's new additive oil—the first fully compounded additive oil approved by every major U.S. manufacturer of aircraft piston engines.

Here are answers to 10 key questions about AeroShell® Oil W —how it helps keep engines cleaner, reduces wear—even extends periods between engine overhauls.



Left: Piston from engine using straight mineral oil after 1,000 hours; note sludge and coke. *Right:* Piston from same aircraft after 1,000 hours on AeroShell Oil W.

1. What types of aircraft can use AeroShell Oil W? Piston engine planes of any size. Helicopters, too.

2. Why is it called a non-ash dispersant oil? Because it contains special metal-free additives that help keep tiny, ingested particles in the oil from clumping together and forming deposits. These particles remain suspended and dispersed.

3. How does this affect engine performance? It means that engine parts stay cleaner. That lubrication points get all the oil they need. *Your engine can run more efficiently, parts can last longer.*

4. What about oil consumption? Because AeroShell Oil W helps provide a cleaner engine and less wear, you can expect less oil consumption.

5. Can AeroShell Oil W reduce maintenance costs? If you have been using a straight mineral oil, AeroShell Oil W can reduce your maintenance costs substantially. Intervals between engine overhauls can be extended.

6. How does this new oil respond from a cold start? AeroShell Oil W has an unusually high viscosity index. This guards against excessive thickening of the oil when cold, yet provides proper lubrication when hot. Result: *easier starting, faster warm-up.*

7. Is AeroShell Oil W thoroughly proved? Thoroughly. It's had millions of engine hours of flight time.

8. Can AeroShell Oil W be added as a make-up oil? Yes. It is compatible with all piston engine oils now being used.

9. Is there more than one viscosity grade? AeroShell Oil W is available in *three* viscosity grades: 100 and 120 grades for large engines. And 80 grade for small engines where straight mineral oil grade 55, 65, or 80 is normally recommended.

10. Where is it available? At Shell Aviation Dealers everywhere. *Any* dealer will stock AeroShell Oil W if you ask him.

Technical bulletin on AeroShell Oil W will be sent at your request. Write: Shell Oil Company, 50 West 50th St., New York 20, N. Y.

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Non-degree courses available — FAA Approved, A & E Mechanics — 45 weeks covering all phases of aircraft and engines.

Flight courses—Private, Commercial, Instrument, Instructor and Multi-engine Ratings.

All Parks Schooling is Approved for Veterans. Remember too, the PARKS faculty combines the talents of men holding advanced academic degrees as well as experts from the aviation industry.

PARKS offers only the most superior training and because this is a fact . . . enjoys an enviable reputation around the world!

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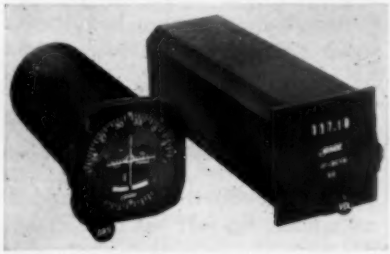
NEW PRODUCTS

A third seat for the Piper Super Cub has been devised—and approved both By FAA and the Canadian DOT—by Roger Borer, Anchorage, Alaska, A & P mechanic. The conversion consists basically of reinforcing structures beneath the baggage compartment floor, and welded-in hangers for seat

belt. Certified to carry 170-pound passenger or equivalent freight within the gross limits of the aircraft, this installation also is approved for the Cub on floats. Time required for installation is around 16 hours. Kits are available for $195 complete (except seat belt) f.o.b. Anchorage, 1307 W. 9th Place.

Compact portable oxygen system, weighing just two pounds, has been added to Zep Aero's product line. Named the Zep-O-Life, the new unit contains no regulators, hoses or manual valves; operation is controlled by facial contact. The duration per sphere is approximately one hour. Model Z-300 comes in compact carrying case with extra sphere. Available through dealers for $49.50.

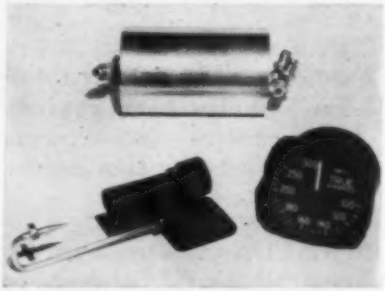
Dare, Inc., Troy, Ohio, has introduced an all-new, fully transistorized Nav-Comm system comprising the DR-480 crystal-controlled receiver covering frequencies 108.0 to 131.95 mc *(right)*, with built-in glide slope, and DNCI-1 Indicator-Converter *(left)*. Designed to fit all types of aircraft, each unit fits standard 3¼ inch panel opening without shock mounting. The DNCI-1,



consisting of indicator and transistorized VOR-LOC converter in one package, is designed to work with the DR-480 or any standard omni receiver. Together, the units weigh five pounds and draw 170 milliamperes of current at 27.5 volts, DC. The system operates from either a standard electrical system or external battery pack.

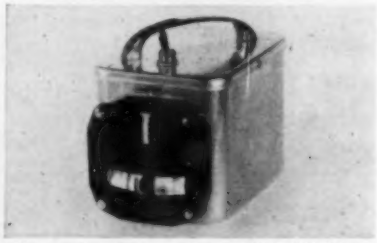
King Radio Corporation's latest product for the general aviation market is the KR-20. A two-pound, fully transistorized, marker beacon receiver (14 or 28 volts), the KR-20 *(top right)* features receiver and antenna in a single streamlined fin *(bottom right)* that mounts on the undersurface of the aircraft, airline standard three-light visual indication and four-way dimming switch. Lights and switch are all that are installed in the cockpit. Sensitivity and selectivity meet FAA-TSO requirements. Priced at $295 for Receiver/Antenna and three-light indication, 139 So. Brockway, Olathe, Kan.

Hunter True Airspeed Indicator, automatically compensating for atmospheric differentials and temperature, is designed to give true airspeed at any altitude. Numbers start at 100 mph so there is no confusion with indicated airspeed on takeoffs and landings. FAA-approved for installation in



either single- or twin-engine aircraft, one kit is complete for either; can be installed by any A & P in about two hours. Complete kit $250. Hunter Aero Instrument Co. P. O. Box 7055, Tulsa, Okla.

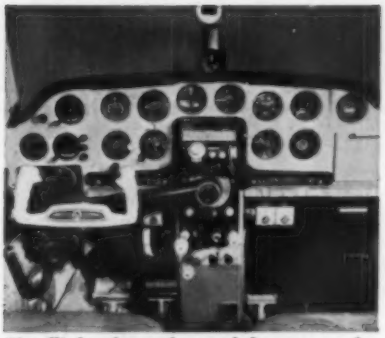
Specifically designed to provide emergency turn-and-bank in the event of vacuum or electric power failure, Waltham



Electronics Corp., (Box 66) Waltham, Mass., is marketing a completely self-contained needle-and-ball. Called Instrument Lifesaver, the price is $95.

A white hood for advanced instrument training has been developed by Aero Products Research, Inc., 339 N. Canon Dr., Beverly Hills, Calif. Designated as the APR CT-100, the hood is constructed of "transprobolene," a new cloudy white material, which creates a visual atmosphere comparable to actual flying weather. The introductory price is $11.95.

By far the strongest and best built plane in its size class, the Bonanza flies at speeds up to 205 mph.



Big flight-planned panel has room for complete VHF 2½ system, ADF, and autopilot—without crowding.

No other single-engine airplane offers the luxurious comfort, quiet and superb craftsmanship of the Bonanza.

Big baggage compartment has 270-pound capacity—and all luggage is accessible from the cabin.

If Beechcraft Bonanzas Were Free . . .

. . . or if all single-engine business planes cost the same to buy, there is little doubt that most pilots who now own other makes of airplanes would own a Bonanza instead. However, despite the fact that a Bonanza costs less to own and fly* than other similarly equipped airplanes in its size and speed range, the slightly higher initial price of a Bonanza does cause a number of pilots to settle, quite reluctantly, for lesser airplanes.

Some people have asked, "Can't you build the Bonanza to sell for less?" The answer boils down to this one simple statement:

There is no short cut to building a Bonanza.

Unless, of course, we dropped a lot of standard equipment features that help to make the Bonanza the world's most wanted single-engine airplane. Features like fuel injection, fully enclosed wheel wells, adjustable cowl flaps, electrically operated wing flaps, aileron trim control, 4-position throw-over control wheel, creep-proof vernier engine controls, and individually reclining rear seats.

We could also eliminate the ultra-violet proof windshield, tinted cabin windows, openable rear windows, full instrument grouping, soundproofing and many other features that Bonanza owners take for granted.

Yes, we could skimp and leave some of the above standard extras out of the Bonanza and it would still be the finest, most rugged, and best built airplane in its field. And it would cost less.

But it would no longer be a Bonanza.

And, after all, first cost isn't everything. When you consider extra tax savings, extra travel time saved due to higher speed, reduced maintenance due to better construction, lower operating costs, and substantially higher resale value, the Bonanza *actually costs less* to own and fly than its competitors. Your Beechcraft distributor or dealer can prove it to you in black and white. Why not ask him to do so? Probably you're a lot closer to owning a Bonanza than you thought.

Write today for latest information on low-cost Beech leasing and financing plans. Address: Beech Acceptance Corp., Wichita 1, Kansas, U. S. A.

Beechcraft

BEECHCRAFTS ARE THE AIR FLEET OF AMERICAN BUSINESS

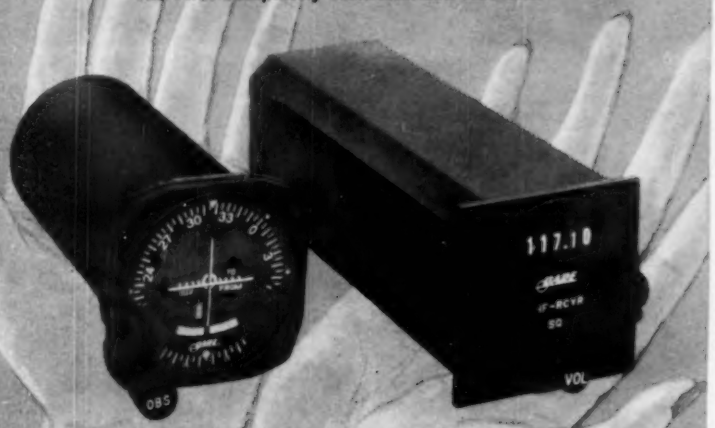
*Based on normal 5-year investment.

First in a complete miniature line!

NEW!

DARE MINIATURE NAV SYSTEM

The First Completely Transistorized Nav Unit



* **Less than 0.2 amperes total current**
5 pounds total weight
Meets TSO and FCC requirements

Here's the entire system for precise Omni-Loc navigation and VHF reception. Two handfuls of dependable transistorized circuitry do the whole job. No external power supplies, no extra black boxes. It's all here with nothing to add.

The DR-480 Receiver ... with its fast digital control provides coverage of 480 channels from 108.00 to 131.95 mc. So sensitive, a 5 microvolt signal will produce rated navigation and audio outputs. The standard instrument case is only 10⅝" deep installed behind your instrument panel. Automatic Glide Slope Channeling Control is already included. This receiver is also ideal for ferrying and emergency use, for it can be operated easily from a simple battery pack or any aircraft DC electrical system.

The DNCI-1 Converter-Indicator ... is all transistorized in one standard instrument case only 8⅝" deep installed. Full instrumentation to latest military design includes FPDI needles for VOR and GS, Flag Alarms for VOR, LOC and GS, as well as To/From indicator. Maximum bearing error is ± 2°.

Pilots! Aircraft Owners! Win this Nav Unit in Dare's Name the Line Contest

Dare wants a new name for its new, miniature Nav-Comm equipment. The VOR system above is the first of this new line. Other units will offer similar outstanding features of compactness, light weight and low current consumption. Name the line and win one of several valuable prizes. First prize is the system shown above. Write for entry blank to address below or see your Dare distributor. Entries must be postmarked by midnight, August 31, 1961.

DARE INC. - TROY, OHIO

Distributors at Principal Airports

WHO and WHERE

E. S. Calvert, senior scientific officer of the Royal Aircraft Establishment, Farnborough, England, is recipient of the 1960 Monsanto Aviation Safety Award presented in New York at recent AWA annual meeting. Calvert won the distinction for his glide slope, line-and-bar system now in use at 120 major airports of the world.

Phillip M. Swatek has joined FAA as chief of the office of Public Affairs. A former Navy pilot, Swatek has been Washington correspondent and chief of the bureau for the Cincinnati Enquirer for the past five years.

Harry C. Archer now serves Champion Spark Plug Company as aviation sales manager. With the company since 1953, he was formerly aviation marketing assistant.

Henry I. McGee, president of Dallas Airmotive Inc. (Tex.) and Mrs. Isabel McKay, president of Embry-Riddle Aeronautical Inst., Miami, Fla., have been elected president and vice president, respectively, of the National Aeronautical Services Assn., Washington, D. C. Harry S. Baer Jr. is re-elected secretary-treasurer.

Donald G. Shay, manager Seattle-Tacoma International Airport, is a new member of the board of directors of the American Assn. of Airport Executives (AAAE).

George Rosen, head of aerodynamics and hydrodynamics of United Aircraft's Hamilton Standard Division, has been awarded the company's George Mead Medal in recognition of his invention of the variable camber propeller.

P. J. Waite has succeeded Kenneth J. Bhore as sales manager of the aero division of Rolls-Royce of Canada, Ltd. Bhore has returned to England and a new position with the parent company.

Robert B. Hitchcock has joined Howard Aero, Inc., manufacturers of the twin-engine "500" executive aircraft at San Antonio, Tex., as advertising and public relations director.

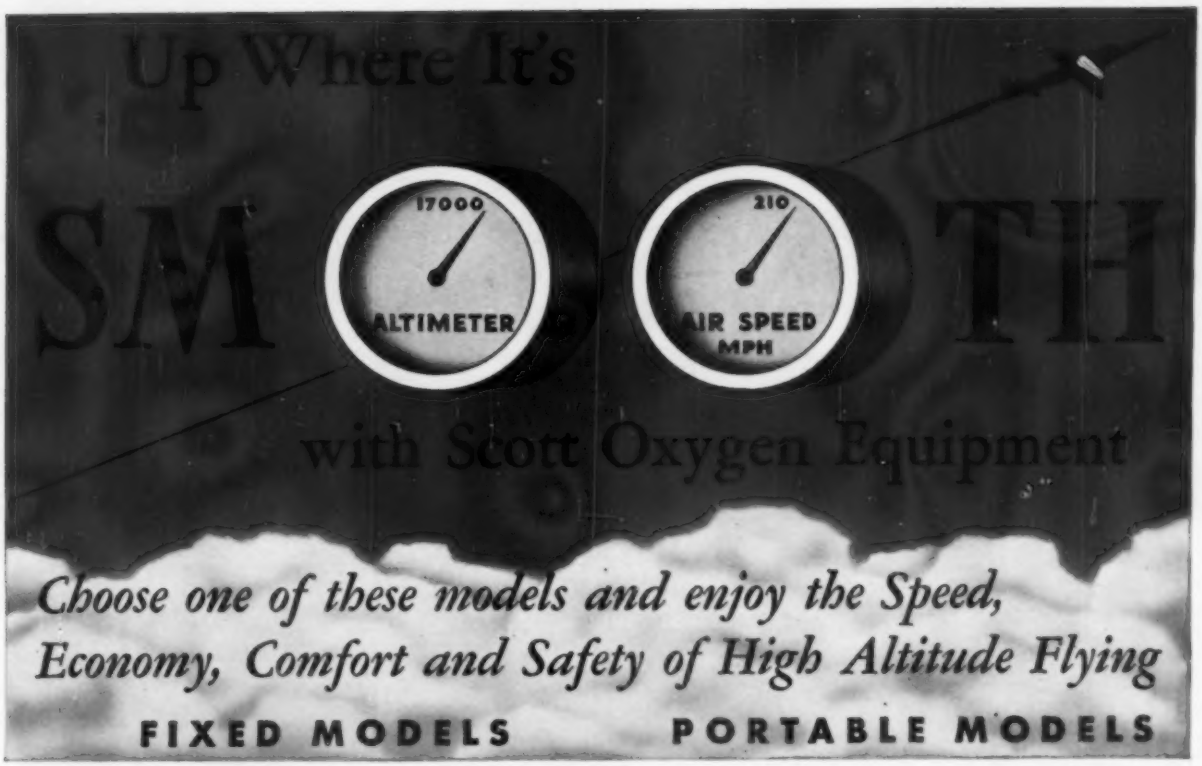
Ralph H. Rudd has moved up from executive vice president to president of the Los Angeles division of North American Aviation, Inc., and vice president of the parent company. Rudd joined North American in 1931 as a tool maker.

W. B. Roberts has succeeded R. F. Bradley, retired, as manager of Standard Oil of California's aviation division.

Henry M. Stewart of Wynnewood, Pa., has joined Air Associates, Inc. as director of marketing, at Teterboro, N. J.

James L. Rhodes of Scottsdale, Ariz., has been appointed by Governor Paul Fannin to the Arizona Aviation Authority.

Clair Stebbins, aviation editor of the Columbus (O.) Dispatch was elected president of the Aviation/Space Writers Assn. at recent annual meeting in New York. Also elected: Julian Hartt, Los Angeles Examiner, 1st vice president; E. H. Pickering, Ft. Worth, Tex., 2nd vice president, and L. L. Doty, Aviation Week, 3rd vice president. Re-elected: Ralph McClarren, exec.-sect'y; Leslie Spenser, treas., and Kendall Hoyt, historian.



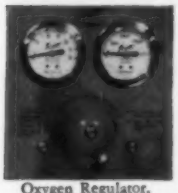
Choose one of these models and enjoy the Speed, Economy, Comfort and Safety of High Altitude Flying

FIXED MODELS **PORTABLE MODELS**

World's simplest fixed oxygen installation.

Scott Oxygen CONSOLE

Compact. Light Weight. Safe. Lowest priced fixed oxygen system available. Simple to use — just set at cruising altitude and plug in as many masks as needed. Each outlet is an ON-OFF valve. Supplies oxygen for one to five persons.



Oxygen Regulator. Wgt. only 21 oz.

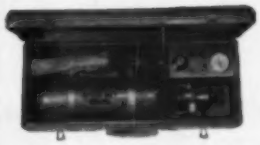
Manifold. Five mask outlets.

Masks included.

Scott "PRESIDENT"

A complete oxygen installation for five people furnished in kit form, for all aircraft. Includes Oxygen Regulator, Manifold, Oxygen Cylinder, Mask Assemblies, all fittings and necessary tubing. A convenient and efficient installation for single and light twin Aircraft.

Scott AVIOX



Cylinder can easily be removed for refilling or replacement.

Complete oxygen breathing equipment for four in a smart, leather luggage case. Portable — F.A.A. weight and balance data is not required. Variable regulator provides maximum oxygen efficiency. Unquestionably the world's finest portable.

Your comfort is "in the bag" when you fly high with a beautiful Aviox.

Scott "EXECUTIVE"

A complete oxygen system — ultra compact . . . self-contained . . . no installation. The Scott EXECUTIVE has all the basic parts to provide supplementary oxygen for one or two persons to 20,000 feet. Carrying handle attached to cylinder by metal straps. Cylinder valve, manifold, oxygen regulator and gauge combined compactly in one unit. Simple to use — just turn knob, plug in masks and breathe! The low price of this complete unit will please you.

Scott — SINCE 1932 — SAFETY-FOR SERVICE

SCOTT AVIATION CORPORATION

224 ERIE STREET • LANCASTER, NEW YORK

Export: Southern Oxygen Co., 3 West 57th Street, New York 19, N. Y.

West Coast Office: Fulton-Ventura Building, 13273 Ventura Boulevard, Studio City, California

SEPTEMBER 1, 1927 CONCORD, CALIFORNIA

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For other courses, see pages 76 & 84

HAVE YOU READ?

By JAMES F. SUNDERMAN

STRATEGIC AIR COMMAND, by Mel Hunter (Doubleday, 575 Madison Ave., New York 22, N. Y., $4.95).

The mixed-deterrent—manned bombers and missiles—which make up the U. S. and free world's primary offensive military force comes in for full picture-narrative treatment.

This book encompasses the story of SAC today and is carried in the narrative and the captions to the more than 225 photos, with primary focus on the human element, the men who crew the bombers on strip and airborne alert, on round-the-clock maintenance, on command post duty, on missile stand-by at SAC's growing missile complexes and the many other facets of the strategic mission at bases round the world. Hunter's photos are unique and unusual and capture the spirit and substance of modern military aerospacepower, making the volume a blend of exquisite scenes and facts of cold war operations.

THE LIGHTNING BOOK, by Peter Viemeister (Doubleday, 575 Madison Ave., N. Y. 22, N. Y., $4.50).

Drawing on a wide background knowledge of man's most destructive natural phenomena, Viemester writes here a fascinating study of lightning, its history, legends, causes, effects, control and how protection can be taken from it both in the air and on the ground.

The expert advice he gives should be of interest to all who fly, for few are the pilots who at one time or another have not watched "St. Elmo's Fire" dance across the wings, nor sat in breathless awe as pierced streaks of fire gash the sky outside the cockpit windows.

HELL IN THE HEAVENS: THE TRUE COMBAT ADVENTURES OF A MARINE FIGHTER PILOT, by Capt. John M. Foster, USMC (Res) (G. P. Putnam's Sons, 210 Madison Ave., New York 16, N. Y., $4.95).

This is a book without a hero and without anything particularly exciting to say, as war adventure books go these days. It is this quality, however, which makes it good reading, especially for those who flew during WW II in the South or Southwest Pacific theater. It recreates the day-by-day life and flying experiences of one Marine pilot who flew his heart out against the Japs and never shot one down. There are no moments of personal triumph, no hours of glory, no special emoluments. It is thus the story of a lot of us who did the same thing but whose accumulated efforts made up the overwhelming force which drove the Japanese from the skies. Foster packs his book with scenes, events, memories that vividly recall all that was good and bad about duty in the stinking, wet, bug-infested, disease-ridden island jungles. It will evoke many long, long thoughts, and perhaps a wish or two that the whole thing could be done over, differently of course.

THIS WAS AIR TRAVEL, by Henry R. Palmer Jr. (Superior Publishing Company, 2809 Third Ave., Seattle 11, Wash., $11.95).

Palmer's copiously photo-illustrated history of commercial air travel begins with early ballooning and traces civilian air Many rare pictures of aircraft, operational scenes and flyers appear with caption and narrative sequence, recalling in nostalgic terms the yesterdays of a great era which technology has fast overtaken.

WARPLANES OF THE WORLD, by J. R. Ransom (Simmons-Boardman, 30 Church St., New York 7, N. Y., $1.95).

Photo-narrative description of all leading military aircraft in the world.

STRIKE FROM THE SKY: THE STORY OF THE BATTLE OF BRITAIN, by Alexander McKee (Little, Brown, 34 Beacon St., Boston 6, Mass., $4.75).

Writing mainly from the operational pilot's point of view, Alexander McKee brings the great air battle into focus and perspective. Against this he traces the Nazi tactics and strategy, first to clear the Channel of all shipping, then the air of all RAF fighters. He matches this with the evolution of British counter tactics, vividly describing the fluid and resilient moves on both sides.

"The limiting factor on the British side," write McKee, "was pilots and not aircraft." The RAF could have used 100 more pilots, for it was not unusual for units to have 100 per cent turnover. Yet even against a small group of RAF flyers, the Luftwaffe could not prevail. There were great errors in Nazi High Command Decision. Foremost was the timing, the summer being spent by the Luftwaffe concentrating on the Channel shipping. By August 12, when operations switched to England proper, only a few weeks of good English weather remained. The miscalculation of dogged British determination and the underestimation of RAF crews in their Hurricanes and Spitfires played equal roles in England's final victory.

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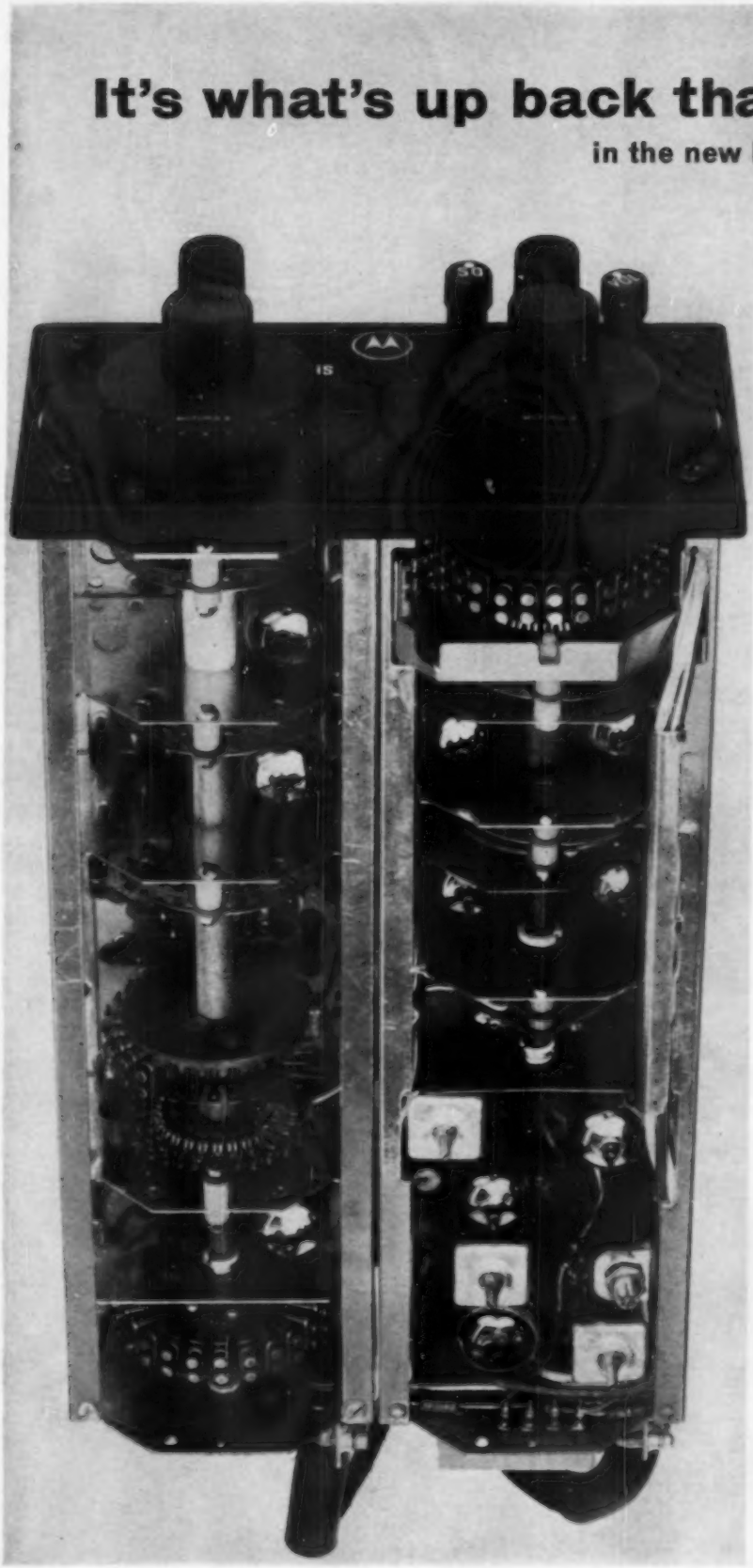

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Briefing Time

GILL ROBB WILSON
Publisher

I FIND MYSELF continuously listening. It is like huddling for a briefing.

Now a briefing was an ordeal. Sometimes you could smell yourself stink with the sweat of fear. Sometimes you cursed as the odds were unfolded against you. Maybe you crossed yourself in resignation.

But you listened as the target was announced, the flight plan unfolded, the enemy opposition calculated, the weather forecast and sundry information detailed.

Then in due course you taxied out and formed up and climbed away—the new replacement along with the combat veteran, the fearful and the bold wing to wing, the scantly skilled in formation with the Ace. Everyone went. It was better to go than to stay.

There was something overriding that drove you to go—that held you up despite combat fatigue and fear. You can believe there was.

And what was this memorable thing that was like a dynamo charging your pride and powering your will?

I have no single word for it. I know only that it resulted from being briefed. Thereafter duty was as clear cut as a vertical fin. Challenge was as bright as the sun above the overcast. Responsibility was as fixed as the North Star. You knew where your job fitted in the plan of Victory.

After you sat in enough briefings you knew that you and the outfit would be helpless without them. Unbriefed, you might be a mouse but briefed into the mission you were a tall man.

Little did I ever dream that I would live to crave the ordeal of more briefings. But that is the way it is with me now. I ache with nostalgia for command decision. Who is my enemy? Where is the target? What is victory? The silence deafens me.

Recently I stood with a group of men to watch Alan Shepard's rocket hop. As the count-down proceeded, one of them said, "This is a moment for prayer."

"Yes," I thought to myself, "but for the country as well as the Commander," for I could not forget the filthy avarice of those who demanded their pound of flesh at Canaveral.

In my book that's treason. Nor am I impressed with official indignation after the fact. Where was official responsibility before the fact? Who guards the public weal against such ilk? Who writes the laws for the leeches?

Much is suddenly made of the Cuban fiasco and dismal lack of security intelligence. That tale is as mossy as the old oaken bucket. We didn't know about the Soviet MiG until after it was long operational, nor about the Korean war until it debouched from the hills, nor of the Berlin Blockade until it was a fact. We didn't know Castro was a Commie, until he assured us. But why multiply the indictment? What we haven't known about China and Asia and Africa and South America and the futility of dollar diplomacy is a tragedy second only to what we haven't known about ourselves.

I'm old enough to be knowledgeable about politics and military affairs and foreign relations. Nobody is going to make a socialist out of me, or a pinko or a cynic or a trembler for security. But if today even such as I feel the craving for a briefing, what must it be with those whose future is still ahead of them?

How can they be moulded in fervid loyalty and respect for a government that can't or won't deal with labor criminals? How can they believe in the character of a government which piles taxation on taxation but can't even defend itself against thievery in the billions? What is to say about a national program which majors in sociology when the issue is survival? How can we tell the young they must believe in peace without honor?

Maybe I expect too much. Maybe our leadership is trapped by influences beyond command decision. Maybe the victory plan is too nebulous for articulation.

I've figured government had one more crack at briefing us but maybe I'm just an old pilot who has looked too long into the sun.

None the less it's my privilege to die hard if I want to. So I'll keep listening for a briefing. Nobody should know more about the necessity of briefings than the skipper of a PT boat.

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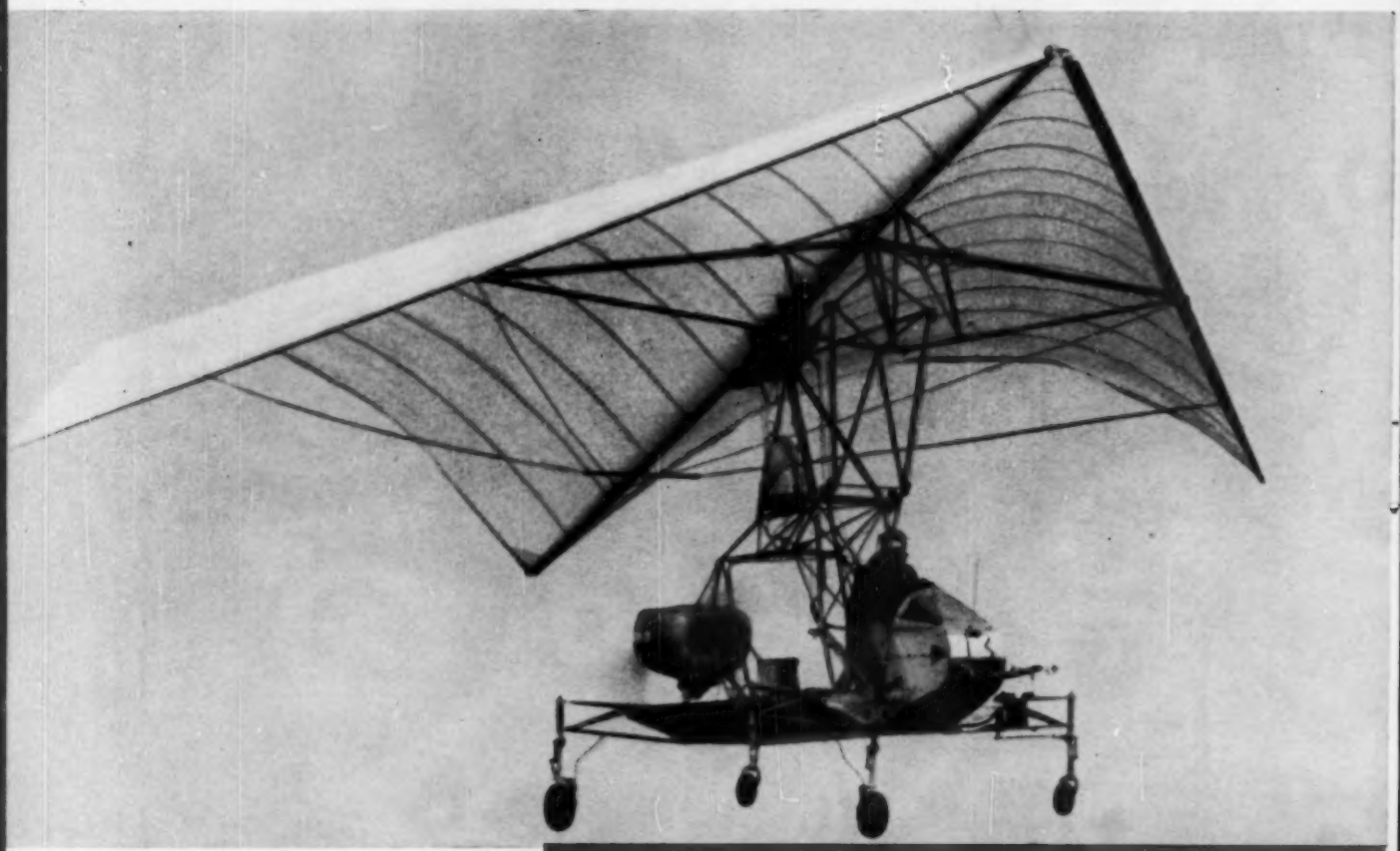


The Ryan Flex Wing aircraft—test bed for a new type of flight vehicle. It is powered by a 100-hp Continental engine.

Flexible wing lightplane

This strange new "sail in the sky," now undergoing flight test, is able to cut lightplane costs in half

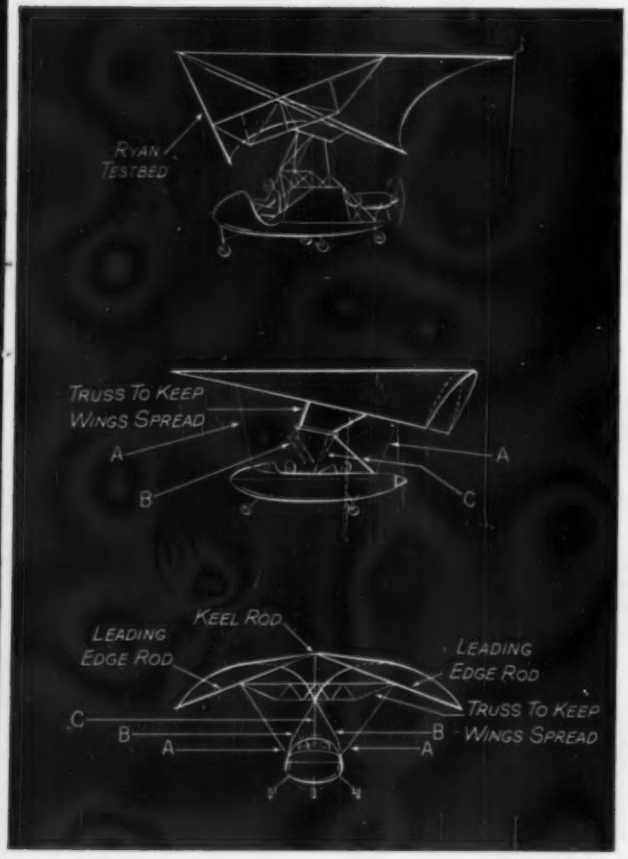
By J. S. BUTZ, JR.

CUTTING THE COST of owning a lightplane in half is a dream that most people in civil aviation abandoned long ago. Several good reasons why this isn't possible can be documented by anyone familiar with the problems of manufacturing sheet metal structure and aircraft engines; a fundamentally new type of lightweight airplane would have to be available if there is to be any chance of making airplanes half as expensive as they are today.

Today, it is sensible to hope for this big cost reduction because of a radically new type of airplane presently in flight test stage. The main feature of this aircraft is a flexible wing made of cloth and resembling a kite. It is not any more complicated than the sail on a small boat and it isn't much heavier than a parachute.

Three poles are the only solid members in the triangular flexible wing. These poles would each be about 20 feet long on a four-place lightplane. Connected at the wing's forward apex, the poles serve as its leading edges and its center keel. The flexible lifting surfaces would balloon out between the three poles during flight. A lightweight truss would hold the poles apart and carry the lifting loads from the wing into the fuselage hanging below it. Virtually any structure from a basket on up could be used for the fuselage. The engine could be mounted on it in either tractor or pusher arrangement. No tail surfaces are needed on the flexible wing airplane; it is extremely stable without a tail and the cloth surfaces do not have any tendency to breathe, flutter or collapse.

Right: **In the wind tunnel, this NASA-built research glider has shown capability as a method for recovering space vehicles.**



Left: **Some of the applications of a flex-wing lightplane. A shows control cables, B and C are front, rear truss supports.**

The flexible wing has been proven to be a practical device through almost 15 years of model tests by its inventor, Francis M. Rogallo, of the National Aeronautics and Space Administration's Langley Research Center.

A full-scale man-carrying airplane using the flexible wing has been built by the Ryan Aeronautical Company. Flight tests of the airplane have been underway for several months and are in fact proving to be very successful.

The U. S. Army Transportation Research Command awarded Ryan a contract to conduct these tests and to study the application of the flexible wing airplane to the problem of moving large numbers of troops around a battlefield.

The Army has great hopes for this airplane becoming the first true aerial truck. This is a pretty big order because any aircraft that qualifies as an aerial truck must meet two difficult requirements. First, it must be cheap enough to use in very large numbers. Second, it must be G.I.-proof, so simple to fly and maintain that it can be handled by the soldiers in an average Army unit. Of course, the Army has several other requirements such as landing (*Continued on page* 80)

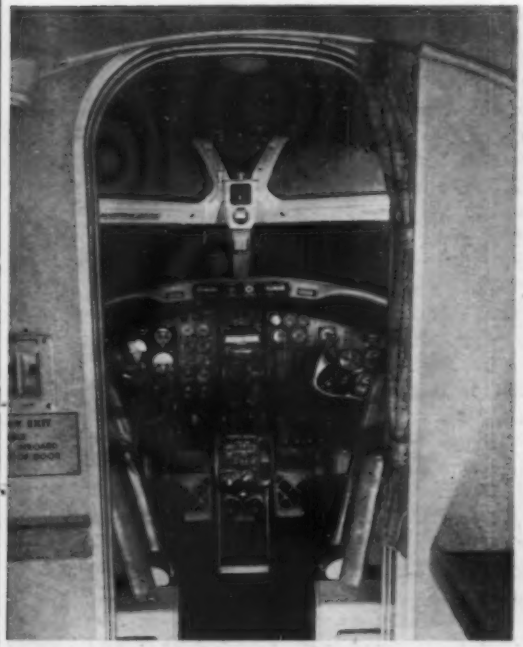
PILOT REPORT:

NORTH AMERICAN T-39 SABRELINER

Twin Pratt and Whitney J60-P-3 turbojets of 3,000 pounds thrust each give the aircraft a 500-mph cruising speed, with 1,725-mi. range.

By RICHARD L. SWEENEY

Compact size, high performance, handling ease give USAF's jet good potential for business use



Above: Sabreliner cockpit. *Below:* The cabin seats six, and can be quickly converted for cargo configuration.

WHETHER North American Aviation's Sabreliner wears the blue star of the United States Air Force or the assorted colors of civilian life, flying the small jet transport will be an enjoyable experience for the pilot.

During FLYING'S evaluation at Edwards Air Force Base the Sabreliner gave this pilot the firm impression that it is fun to fly. We flew the number-five production airplane, T-39A USAF 59872. The Air Force has ordered 94 of the twin-jet utility transports.

North American has not yet committed itself to putting the Sabreliner on sale commercially, but there are a number of reasons why the airplane would enjoy specific advantages in the commercial market, and North American has conducted an extensive market survey of the aircraft's potential as a business aircraft.

One advantage is that the contract calls for the airplane to be certificated under the transport category of Civil Air Regulations, Part 04b. The Sabreliner now is undergoing flight test for its FAA certificate, and should have its ticket by the end of August or early September.

Along with FAA certification, the T-39 has been undergoing the Air Force category testing. Capt. Douglas Benefield, USAF T-39 project test pilot, was aboard during the FLYING evaluation. The powerplants of

Below: Utility jet wing span and length are 44 ft. The low fuselage aids in maintenance.

the Sabreliner are Pratt & Whitney J60-P-3 (military designation for JT12-A-6) turbojets of 3,000 pounds dry static thrust each. These are the same engines that are used to power both the Lockheed JetStar and the Canadair CL-41 trainer. Their rating is expected to increase later this year to 3,300 pounds.

The Sabreliner has a completely mechanical (cable, push-pull and torque tubes) flight control system. Forces can build up at high Mach numbers and high q (dynamic pressures), but in no case does the aircraft become extremely stiff on controls, even when flown at Mach 0.82.

Stability is very noticeable at high altitudes, over 43,000 feet, where turns were made pulling enough Gs to induce a mild but definite buffet. The airplane trims out well at altitude, there is no tendency to mush about, and the F39A is crisp in its responses, definite in its movements.

Gross weight of the Sabreliner at takeoff for the three-hour flight was about 17,000 pounds. The airplane had a full load of fuel, and six passengers and parachutes were aboard. Baggage was the only item lacking to bring weight to the airplane's maximum-gross 17,760 pounds.

Exterior inspection of the airplane consists of a check for general condition and cleanliness. Closest approach to a gauge to be checked is the nose gear torque link disconnect plug (electrical), which is to be securely connected. There are no half-hidden items to be checked or gauges to be scrutinized.

With an outside air temperature of 58 degrees F, the Sabreliner's ground roll approximated 3,100 feet. V_2 or liftoff speed was 117 knots with rotation at about 110 knots IAS. The T-39 requires a definite rotation, and after it breaks ground, it keeps a steep climb angle which is not unpleasant.

Minimum control speed (without nosewheel hydraulic steering) is 90 knots. This is the closest thing to a control on takeoffs; refusal speeds such as large jet transports have due to runway lengths are no concern to the Sabreliner.

The T-39's initial takeoff was followed by a climb of better than 6,000 fpm on the vertical speed indicator at full military thrust. The airplane reached 20,000 feet msl six and one-half minutes after liftoff from Edwards AFB (which is 2,300 feet above sea level), 31,000 feet in 11.5 minutes and 35,000 feet in 15.5 minutes. Normal climb airspeed is 260 knots IAS, which is reduced at the rate of about five knots per 10,000 feet above 10,000 feet. At 35,000 feet, climb is held at 0.65.

After leaving at 35,000, the T-39 took about one minute in level flight to accelerate from 0.65 Mach to what currently is the FAA Vne (never exceeds or redline speed) of 0.765 Mach number. In its tests, the airplane has been to 0.85 Mach with USAF, which same value is Vdem (maximum demonstrated dive speed) for the FAA certification tests. USAF plans to operate the airplane at 0.765 Mach for Vne, and maximum indicated airspeed for dynamic pressure (q) limit is 455 knots IAS.

A fast descent from 35,000 feet to 15,000 feet was made holding Vne with speed brakes out and idle power. The T-39's actual descent rate approximated 16,000 fpm down to the level chosen for stall sampling and other medium-altitude airwork.

Attitude of the Sabreliner going into a power-off stall is very nose-high, with approximately a 20-degree angle of attack. Geometry of the airplane is such, however, that actual angle of attack to (*Continued on page* 84)

Left: Cabin flexibility permits full cargo or both cargo and passengers. *Below, left:* In the T-39B configuration, radar sets are mounted in the aircraft for instruction purposes. One student acts as copilot. *Below, right:* A second student operates one of two cabin consoles. The Air Force has ordered 94 T-39s.

FLYING HIGHWAY PATROL

Close cooperation between aircraft and highway patrol cars enables police to keep close tab on reckless drivers on Nevada's 5,000 road-miles.

Nevada police took to the air and highway fatalities took a plunge

By LEW L. GOURLEY

TRAFFIC WAS HEAVY on U. S. 395 south of Reno, Nevada, on the sunny Memorial Day weekend of 1959. Portions of the highway were winding, with no-passing zones, and a seemingly never-ending stream of tourist traffic flowed steadily north and south. The middle-aged driver of a shiny new southbound automobile peered anxiously around the traffic ahead of him. Obviously he was in a hurry. Just beyond the bumper-to-bumper cars before him he saw a gap of a hundred feet or so. He calculated the distance of perhaps a thousand feet to the crest of the hill ahead and saw no oncoming traffic. The 200 horses under the hood responded as he crossed the yellow line and shot abreast of the slower moving traffic.

Suddenly on the skyline appeared a car that fairly leaped toward him; his tires squealed on the asphalt pavement as he swerved back into his lane of traffic. A close call, but he had made it. Fifteen minutes later as this man slowed down to enter Nevada's capitol city, a highway patrol car with flashing light and siren prompted him to pull over and stop.

Robert F. Stenovich, *left*, Nevada's superintendent of highway patrol, checks the day's mission with Cub pilot Lew Gourley.

"May I please see your driver's license?" asked the patrolman.

"Certainly," replied the man.

The patrolman glanced at the license, jotted down the name and number and returned the wallet. "I presume you're vacationing, sir."

"That's right," the man said. "Is there something wrong?"

The patrolman told him. "Only a quarter of an hour ago you violated a no-passing zone and narrowly missed an oncoming station wagon, which you forced off the road. Your recklessness could easily have resulted in a fatal accident."

The voice faltered. "Officer, that was (*Continued on page* 91)

WHAT AIRMEN

The new administrator went directly to 300,000 pilots for suggestions on improving aviation. First disclosure of results

By KENDALL K. HOYT

WHO KNOWS what the nation's air pilots want Government to do or undo? Administrator Halaby knows . . . or he will when his staff at FAA has gone far enough into the pile of letters and reports to find the best starters among hundreds of ideas.

All this has resulted from his "Dear Fellow Airman" appeal and the regional Air-Share meetings for pilots and plane owners that followed.

When Mr. Halaby came into office, he inherited a raft of complaints.

Part of the trouble was the result of growth. Old timers, flying with less freedom, found it easy to blame Bureaucracy for their frustrations, and they were inflamed by writers who attacked the FAA dragon at a nickel a word. Partly, it was due to the Quesada way of charging into beehives without first tranquilizing the bees; also to junking the CAA-ACC system for consulting people before telling them what to do.

Between Quesada and Halaby, Deputy James T. Pyle braved pilot wrath to make conciliatory speeches. But the pilots were in a mood to talk rather than listen.

So out went the Halaby letter, asking "fellow airmen" for their ideas; not "just their gripes."

This was mailed to nearly 300,000 U. S. pilots with valid medical certificates; not to mechanics, parachute riggers, and other airmen, for lack of current lists.

Response was instant and eager. All sorts of pilots from students to airline captains gave their views. Some typed on crisp business stationery.

Some pilots scrawled on ruled paper or on the back of the Halaby letter.

A few replies were harsh, some screwball, some on local or personal matters, and some pathetic. Families whose sons had been killed wanted to hear no more about flying.

A wife opened the letter "with trembling hands" because her husband had been through an accident and she thought, "Here starts the red tape."

Thanks for good advice

By NAJEEB E. HALABY

Federal Aviation Agency Administrator

***THE NATION-WIDE RESPONSE** of airmen to FAA's requests for advice, both by letter and in our regional Air-Share meetings, has advanced the work we must do for business and private flying.*

We must think years ahead because this is the expanding part of aviation. While the air carrier fleet will grow comparatively little and manned flight by the armed forces will decline, general aviation is likely to double in airplane-hours within 15 years.

Expanding volume will enable the aircraft makers to keep improving their planes, and the airport operators to improve ground facilities.

FAA must keep ahead of the trend; we must not lag behind it. Airports, airways, and control areas must be planned for the safe flow of ever-mounting traffic.

Most important is our aid to the pilots on whose judgment and skill the future of general aviation depends.

Pilot error is the main cause of accidents, mostly among

WANT FROM FAA

But the great majority made reasoned observations that, in sum, may do much to make flying easier and safer. The same was true of the give-and-take of open forums in the Air-Share meetings.

First the pilot's letters. Here is a sampling of the ideas without comment on their validity.

Proficiency—Flying skill, as the key to safety and utility, requires: (1) instrument training, (2) improved written tests, (3) higher flight instructor requirements, (4) more designated examiners, and (5) complete investigation of accidents. "Pilots are aware that most lightplane accidents in the past were because pilots did not have to meet present standards."

Information—Airmen should be sent more information on regulations, proposed changes, and flight aids. Airman's Guide should be simplified. It should list all services available. Many are not used enough. Reading should be compulsory.

Regulations—Weed out obsolete items; simplify others. Have another agency make independent review. (Not so many squawks about regs as one might think.)

Airports—Stop the closing of small airports. Keep Mitchel Field. Build more close-in fields. Give permanence to suburban airports, which are becoming shabby as operators expect to sell for real estate developments. Put lights on runways that are in use. Reduce unemployment by aerial turnpike program, with outlying fields and lighted lanes between. Grass fields are hard to see; mark with Dayglow circles. Build airstrips alongside of expressways.

Markers—Put direction markers on highways and print highways heavier on charts. Don't abandon air marker program.

Towers—Should have Morse identifier transmitting when operator is not talking. Many pilots avoid using radio for fear of being penalized for mistakes. A friendly tower man at Raleigh-Durham has changed the general attitude there.

Radio—Radio procedures are cumbersome. Give general aviation a frequency so plane owners will not have to buy multi-channel transmitters. Simplify UHF four-digit figures to use last digit. Radio inspectors are low in FAA safety organization; upgrade them. Start major program for speech intelligibility.

VOR—Circle stations with lights for positive VFR identification.

Flight Service Stations—Are undermanned. Fear of FAA has limited use of flight (*Continued on page* 73)

the unskilled. But we do not want to talk about error; we want to look ahead to pilot success.

To make the most of flying, as it will be in the late '60s and '70s and beyond, we must somehow spark a drive for pilot self-improvement.

The abilities that make flying safer—such as navigational know-how, weather wisdom, use of instruments, and general understanding of the plane—also make flying more useful.

Utility, along with safety, will make a great American industry of business flying and family flying.

How can FAA help most and hinder least? The practical beginning, I thought, was to talk with pilots directly.

Thanks to so many who have given written and verbal advice, every Bureau and office of FAA is sifting a great variety of ideas. Stay with us and we will put these ideas to work.

PILOT REPORT:

KAMAN'S H-43B HUSKIE

USAF'S CRASH-RESCUE HELICOPTER

A 1,000-lb. fire suppression kit carrying foam is held by external sling.

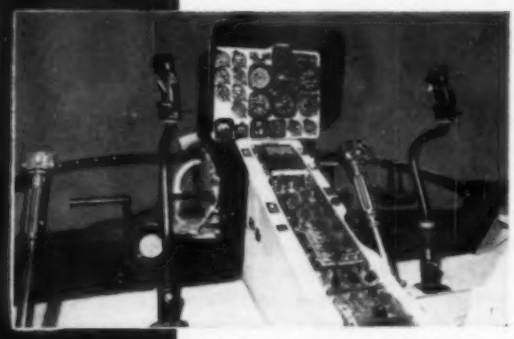
Fast-starting, maneuverable answer to safety needs of the jet age at today's large new commercial airports

By A. C. BASS

THE TURBINE-POWERED Kaman H-43B, designed to meet the rigorous crash-rescue requirements of the U. S. Air Force, is a rotorcraft ideally suited for this task. Among its features:

- From starter button to flight in 30 seconds.
- Speed in excess of 80 knots with a 1,000-pound fire suppression kit slung underneath.
- Positive handling at low airspeeds.
- "Bear Claw" landing gear that solves most terrain problems.

An Air Force study has shown that more than 96 per cent of all accidents occur within 61 miles of the base and 72 per cent occur within 10 miles. These figures have a parallel in civil aviation.



Rapid starting sequence is fully automatic and can be activated by battery.

Counter-rotating blades eliminate need of a tail rotor and intermesh together.

The four individual "bear claw" landing gear permit touch-down on rough terrain.

Although the 43B lays claim to the world altitude record for helicopters of its class at 30,000 feet, established in December of 1959, FLYING's evaluation was not concerned solely with its utility assignments up to that altitude.

In view of the accident study, and of recent strides made in air-fire rescue technique, pioneered by Kaman, this aircraft was put through its paces more specifically as one with a mission that extends into all phases of aviation safety. It could very well be the first entry in the civil market for a safer commercial jet age.

Featuring Kaman's unique synchropter rotor configuration (that maintains a synchronous intermeshing of the counter-rotating blades) and the servo-flap control (that helps eliminate pilot fatigue) the H-43B helicopter represents some 16 years of engineering study and achievement.

The H-43B, known as the Huskie, is a direct descendant of the piston-driven H-43A. The B model, however, employs the Lycoming T53-L-1 gas turbine engine, the first such powerplant to be designed specifically for helicopters. Mounting above and to the rear of the cabin, between the twin tail booms, has greatly reduced engine noise.

Engineering to permit alternate installation of the General Electric T58 for possible future growth in mission requirements has also been made a part of the Huskie's development program.

The rear cabin area formerly occupied by the 43A's piston engine has been transformed into extra space. The B's 166-cubic-foot cargo area is twice that of its predecessor. Two plexiglass clam-shell doors have been added to the rear of the torsion box cabin to facilitate loading.

The T53-L-1 supplies 860 shaft horse power (shp) to the rotors at takeoff and is capable of delivering 770 shp continuous power. This has more than doubled the aircraft's useful load.

At this writing the Air Force has placed orders for 116 Huskies with the Kaman Aircraft Corporation of Bloomfield, Connecticut.

The Fire Fighter—With today's jet ports encompassing vast tracts of land, with approaches often inaccessible to ground vehicles, there exists a growing need to reappraise the adequacy of rolling crash equipment.

Time is the most important single factor in the event of a crash.

With the turbine requiring no warm-up period and throttle acceleration from starting position to full open taking only five seconds, the H-43B can be airborne within 30 seconds, even in sub-zero weather.

The Huskie's remarkable handling characteristics at low airspeeds and in a hover facilitates picking up the 1,000-pound fire suppression kit on its external sling in another half-minute. In the evaluation a 1,000-pound barrel filled with lead and cement was used.

The fire suppression kit is actually a giant extinguisher capable of delivering approximately 700 gallons of foam.

A rescue tool kit for crash entry is secured by straps to the cabin.

Inside the cabin, which can hold as many as 12 fully combat loaded troops, a three-man fire fighting team awaits touch down to disembark. (At sea level and 59 degrees F the Huskie has hovered out of ground effect at a gross weight of 8,800 pounds.)

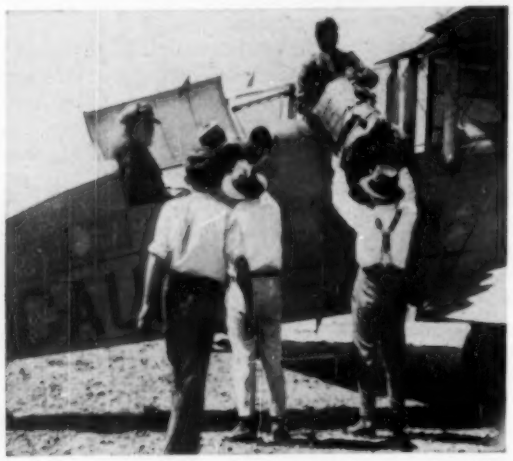
The external cargo hook is quite close to the underside of the cabin, limiting the sway of the kit to negligible amount.

An automatic release frees the kit on ground contact (switch in the cabin also gives the pilot manual control).

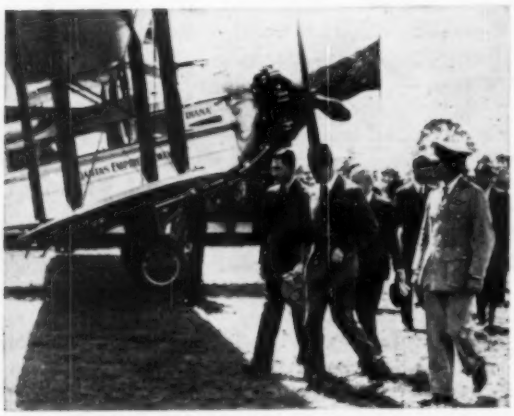
Landing in difficult terrain is no problem as the "bear claw" landing gear adapts itself to almost any situation. The oleo struts permit slope landings up to 10 degrees laterally, 8 degrees nose up, and 20 degrees nose down without any tendency of the aircraft to tip.

- The plexiglass doors on the rear cabin afford 360-degree visibility.
- The short tail and high (*Continued on page 62*)

QANTAS' first aircraft, an Avro 504K, carried two passengers.



Alexander Kennedy at 85 was the first passenger to travel by QANTAS. Here he is seated in the rear cockpit of a DH-9C.



The Duke of Gloucester with Hudson Fysh and Lester Brain at the inaugural flight of the Kangaroo Route in the year 1934.

A 32-passenger S23 "C" class flying boat introduced in 1938.

ON NOVEMBER 2, 1922, five years before Charles A. Lindbergh proved the commercial air age was here to stay, and while adventurous American pilots were trying to keep the fledgling U. S. air mail service airborne, an oddly matched trio walked briskly across an improvised pasture airstrip halfway around the world on the outskirts of the town of Longreach in the tropical Northern Australian state of Queensland.

One was the pilot, a slim, young, dark-haired holder of the Distinguished Flying Cross won during service with the World War I Australian Flying Corps. His name was W. Hudson Fysh. His "flight engineer" was a stocky aviation pioneer named Arthur Baird.

The third member of the trio, who was to make world aviation history that day, was a white-bearded, 85-year-old pioneer of the frontier Australian bush named Alexander Kennedy. He was to become the first paying passenger of record on a scheduled flight.

The trio climbed aboard a single-engine de Havilland DH-9C already loaded with Kennedy's baggage. Earlier, the plane had been flown to Longreach from a town called Charleville, with P. J. McGinness at the controls and Baird as the engineer.

Fysh warmed up the engine and taxied to the end of the strip. Kennedy resolutely adjusted his helmet and goggles. As the throttle was opened, the plane bounced down the runway—but not into the air.

Three times the performance was repeated, but the

QANTAS

QANTAS was the first airline outside of the U.S. to use jet Boeing 707 airliners.

plane stubbornly refused to become airborne. Undaunted, the trio climbed out, and a second aircraft, an Armstrong-Whitworth F.K. 8, was rolled up, and this time they were off and flying.

With this flight, the Queensland and Northern Territories Aerial Services, Ltd. (QANTAS) entered one of the first milestones in its log as the oldest sustained aviation operation in the English-speaking world.

The company, today one of the leading international air carriers, officially came into being on November 16, 1920, when Fysh, McGinness, Baird and a Queensland businessman named Fergus McMaster, organized the pioneer flying service. But it was not until after two years of barnstorming and countless trials and tribulations that the historic first scheduled flight took place.

Kennedy's presence aboard on the takeoff from Longreach was not a coincidence. Some time earlier, the doughty old pioneer, whose legendary feats in the Australian frontier equalled those of the American Wild West, had been approached as a possible investor in the new air line. He finally agreed to put up 200 Australian pounds ($450).

McMaster, the principal business agent for the partners, urged Kennedy to increase his investment to 250 pounds.

"All right," said the old Scotsman, "but only on the condition that I am the first regularly scheduled passenger."

So it was that he dutifully paid 11 pounds for Passenger Ticket No. 1 noting him as "first passenger from Longreach to Cloncurry."

Once the F.K. 8 was airborne, Kennedy, his long, white beard flying in the wind from the open cockpit, clung to his seat in tense but amazed delight. He later admitted that his glimpses of the countryside on the first leg of the flight were fleeting, at best, for the wind whipped his helmet over his eyes and his goggles slipped down and became entangled with his beard.

However, after a brief refueling stop at the town of Winton and a spot of tea, the old gentleman speedily caught on to the problems of open cockpit flying and peered out with interest as Fysh circled over a notorious pub and waterhold of the "outback" known as Dick's Creek.

"Do you recognize it?" shouted Fysh, pointing downward.

"Aye," Kennedy, who once had some colorful experiences there, shouted back. "But keep your height, mon. I know the place only too well."

When the plane landed at Cloncurry shortly before noon, aviation had gained a lasting convert in its first commercial passenger. Kennedy well remembered the eight months it had taken him to trek with his cattle the same rugged 200 miles half a century earlier. From that day until his death at 97, the old man flew once a year over the QANTAS route from Longreach to Cloncurry.

For the four QANTAS partners, the flight was a dream become reality. It was aerial pioneering at its ultimate. However, Fysh logged the *(Continued on page 68)*

Australia's pioneering airline—from open cockpit biplane to modern jetliner

THE DOWN-UNDER AIRLINE

By RICHARD F. MACMILLAN

Cherokee has maximum range of 800 mi., service ceiling of 15,000 ft. and cruises 132 mph at 7,000 ft. Its 160-hp Lycoming burns nine gal/hr.

PIPER AIRCRAFT'S new low-wing, fixed-gear, all-metal Cherokee—the company's replacement for the high-wing fabric covered Tri-Pacer—combines good flying characteristics with the inherited ease of operation of the J-3 Cub. It holds them in an airframe that bears a remarkable resemblance to Piper's sophisticated Comanche.

As it replaces the Tri-Pacer, the airplane also takes over the title as Piper's lowest cost four-place personal and business aircraft. During this evaluation the four-place airplane flew us at a true airspeed of 133 mph. Its range covers up to 800 miles.

Powered by a O-320-B2B Lycoming engine developing 160 hp at 2,700 rpm, the basic cost of this standard PA-28 Cherokee 160 is $9,995. A 150-hp version is also available, listing at $9,795. By September 1, Piper expects to have three to four of the airplanes rolling from its Vero Beach, Fla. assembly line each day.

The first production Cherokee, N500IW, was flown by FLYING from the company's Lock Haven, Pa. runway to 10,000 feet, from an indicated 46 mph to its redline airspeed of 170 mph, and at high and low gross weights. It is a very stable airplane, easy to fly under any condition, with good visibility ranking high on its list of qualities.

The first indication of the airplane's simplicity comes when you step through the big Comanche-style door and slide into the left seat. Flight instruments are logically clustered directly in front of you; engine instruments are to the right. A manifold pressure gage, an unusual instrument in airplanes using fixed-pitch propellers, is installed just to the right of the tachometer, as a backup for that instrument to allow more precise engine control at altitude.

Fuses are herded into a group at the lower center of the instrument panel, with two spares standing guard above the flock.

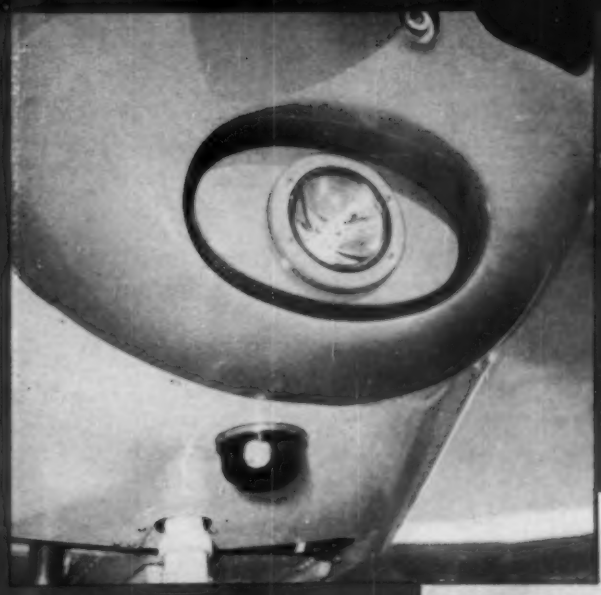
Directly in the center of the panel is the radio space. The evaluation Cherokee, a Super Custom model, carried a Narco VHT-3 Superhomer and a Piper Autonav radio compass. The microphone hangs from the center of the panel, making it a little more accessible to the copilot than in the Tri-Pacer's left-mounted installation.

The Cherokee is a surprisingly roomy airplane. My six-foot-three had to fold a bit as I sat in the left seat only because Piper hasn't put one more catch farther aft on the seat adjustment track. There was more than enough head room, front seat and back.

Engine starting requires no unusual procedures. Taxiing visibility is very good, and with the 22-foot turning radius you can maneuver the Cherokee through a reasonable intricate pattern on the ground. A short handle projecting from beneath the instrument panel between the front seats operates both brakes simultaneously. The parking brake holds the airplane well during runup, but its handle requires a rather aggressive hand to set it as the brakes are held on.

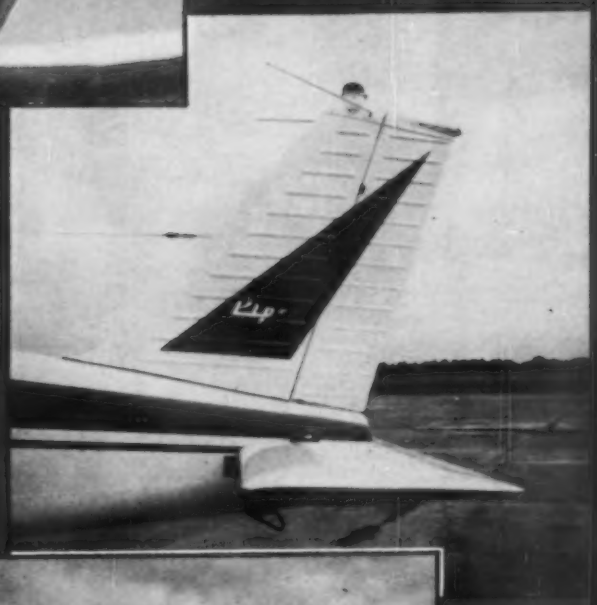
Aside from switching on the twin rotating anticollision beacons, standard equipment on the Custom, Super Custom, and Autoflite models, the Cherokee needs no unusual pre-takeoff check.

During one flight, the air- (*Continued on page* 74)



Right: New one-piece rotating beacon is installed beneath fin. Also, light added to give wider visual coverage.

Below: Swept Comanche-style vertical stabilizer affords straight stabilator to identify the Cherokee.



PILOT REPORT

CHEROKEE

This lowest-cost four-place Piper flies with a long list of virtues, including good performance, ease of flight, visibility and economy

By RICHARD BACH

Above: Three-position flaps are mechanically operated, allow stalling speed of 58 mph. Flapless stall is at 67 mph.

Left: Logical instrument panel arrangement places flight instruments directly ahead of pilot, microphone near copilot.

THE AIRMAN'S WORLD

When in spring the snowpack begins to leave the high country a pilot at altitude may trace the journeying of the waters.

The brooks hurry down to form the creeks whose confluences meld into the lesser rivers which joining together seek the seas, whence in time the waters are lifted again to be cloud borne to the uplands in endless continuation of the cycle.

Often in high solitude I have regarded this benevolent conspiracy of land, sea and sky and pondered that perchance herein is the script of a mystery whose secret is inscrutable but ever pressing on my mind.

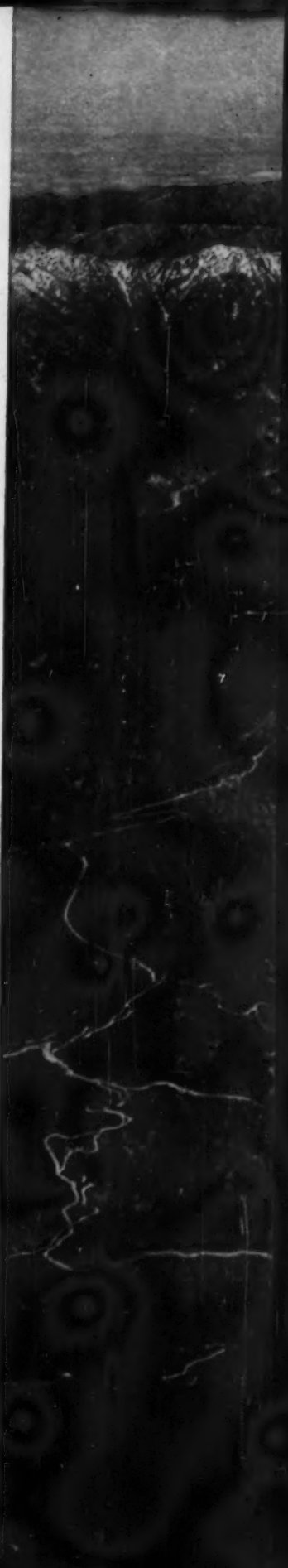
Could this cycle of going out from the fathomless source and this returning in variable time and this ultimate pouring through the delta be the pattern of the journey of my soul?

Is birth the launching of a mission and life a questing and death a returning to the source in preparation to be born again?

Has my climbing of the shafted stairs of sun brought me to see some message of the great teacher or does the watershed but mirror some instinct of my mind?

I can not know. I have no skills for disputation of the holy thoughts. But I may bless the wings which lift me up to see a thing which echoes Him who said, "Ye must be born again."

GILL ROBB WILSON



The BIG bad B-36

It kept peace in the skies without ever dropping a bomb in anger, but it started a war on Capitol Hill

By RICHARD G. NAUGLE

I'LL ALWAYS REMEMBER the B-36 Bomber—and while friends have tried to get me to forget it—"Twelve years is a long time to hold a grudge," they mutter, yet the '36 holds a special place in my . . . *How* in the heck can a plane break its landing-gear and fall down when parked out on the ramp?

Well, it can if it's a B-36.

I entered the B-36 Project Office, Procurement Division, Wright Field, Dayton, Ohio, in 1947 and became the Chief Project Engineer. I left in 1950 after Congress held an Investigation to find out *why* the Air Force was buying them. It was a good question too, and had the '36 itself been called in to testify—it would have been held in contempt of Congress. Actually, it was in contempt of the laws of nature—not of Congress.

Typical too, of the odd way things happened around a '36, it was I in the Air Force Project Office who had a little to do with getting ourselves investigated. And it was such a *little* thing too!

The '36 was a strange, brooding beast. It was moody. It'd squat on the ramp in that hot Texas sun, nose-down, tail-up, sulking and brooding and plotting devilment against mankind—and the Project Office. I never heard of an airplane that did the ridiculous things that a '36 did.

For example, when you say, "The engine is missing"—you mean that it's sputtering. Not on an early '36. You meant that it had fallen off! (Actually, to be fair about it, propellers were the first to fall off. They'd climb up over the wing—still rotating, and whizz by the pilot. It got so, the pilot wasn't surprised at anything that flew past him—even ducks.)

You've also heard the wartime expression, "One of our aircraft is missing, and presumed lost." Well, a '36

"Ah—this is General so-and-so calling. Ah, do you have any B-36s stationed there?"

"Propellers were the first to fall off. They'd climb up over the wing . . . It got so the pilot wasn't surprised at anything that flew past him."

never flew a bombing mission in its life, but we "lost" one just the same. We couldn't find it!

We once added up all the '36s the Air Force had bought, and counted all the '36s we had—and one of them was missing!

It got so even generals were calling up around the country. "Ah—this is General so-and-so calling. Ah, do you have any B-36s stationed there?"

"Yes, we have one."

"One?"

"Yes—one."

"Not two?"

"No-o-o, just one."

"Ah, would you mind going out and counting it again?"

Obviously, minds were snapping.

How *could* you lose a B-36? It had a wingspan longer than the Wright Brothers' first flight, and weighed close to 200 tons! It used to puzzle us at the Project Office. Some thought the Russians had stolen it; others blamed the Navy. There were some who suggested we steal one of their carriers, but nothing came of it.

Finally the mystery was solved. I was down at the static-test laboratory one day, watching wings break off and wading through hydraulic-fluid (a break often tears up the lines to the hydraulic-jacks), when an odd thought struck me. Then I raced to a phone. I'd found the missing B-36! It was the static-test airplane—and it had been at Wright Field all the time!

Actually, I was rather sorry I'd found it. I liked to think that someone, somewhere, had a '36 down in his basement, and that on nights when his wife was out, he'd go down and look at it and kick the tires.

The '36 could think up the darndest tricks! It did things that baffled science. As soon as it could be persuaded to fly above 40,000 feet, it'd come down with jagged holes in the sides of the fuselage. The first guess—that the Navy was trying to shoot it down—sounded plausible until more knowledgeable heads pointed out that the Navy had no fighter that could get up that high and attack it! (It did *not!*)

A camera atop the fin finally solved the mystery. Oil would breathe out the vent of the oil-tank in the wing, and form a frozen ball of oil; finally, it would break loose and go back into the propeller, which would ping-pong it through the side of the fuselage! Then, with diabolical cunning, the ball of oil would melt, so that when the plane landed you couldn't find a trace of it!

Actually, it took an "act" of Congress to make the '36 behave; they asked—and bluntly—why the Air Force was buying them and they held a full-scale investigation to find out.

I remember the day I helped start it.

This too, had the outward innocence and the delayed time-bomb significance of a typical '36 incident.

I should say, in all modesty, (*Continued on page* 89)

Remodeled terminal facilities and 11,000-ft. runway are features of a major expansion program under way at the 5,000-acre International Airport.

EL PASO'S STAKE IN AVIATION

Both civilians and military share space over this Rio Grande City, southwest Texas' booming air center

By BILL THOMPSON

LOCATED in the center of a vast area of Texas desert and mountain country, El Paso is a natural site for the rapid development of air transport. Like most cities, El Paso has always had some aviation activity, but it is only in the last decade that commercial aviation has begun to make its impact really felt.

Most of the aviation activity prior to World War II was furnished by the airlines which have served the city for many years. But military aviation has become an important factor. For example, during the war Biggs Field, now Biggs Air Force Base and once only a wilderness Army base with one lone balloon hangar, sprang into being as a vast bustling base.

As in all great endeavors, the fact that El Paso is now becoming one of the nation's great air centers must be credited to a few dedicated and far-sighted men—men like Federal Judge R. E. Thomason, who was mayor about the time Charles Lindbergh made his historic flight across the Atlantic.

Thomason and his city council dedicated their first little airport less than a year later in 1928, and in his dedication speech, the Mayor said "Today We Drive another Stake in the Progress of El Paso. This city today became one of the country's great air centers."

But the city fathers and early-day pilots lived on a lean diet in so far as aviation was concerned for a number of years, although many of them have lived to see their dreams come true.

What are some of the factors that make El Paso a booming air town? For one thing it lies in the "Paso Del Norte," or Pass of the North as it was named by early explorers who found it was the easiest place to get through the mountains.

El Paso is a bilingual city of 273,000 people with another 333,000 living across the Rio Grande River in Juarez, Mexico. Cotton farming is a major industry in the lush irrigated river lands. Some of the world's largest ore refining smelters are situated there, as are a large garment and fabrics industry, a steel rolling mill and foundrys, and packing plants and refineries.

Probably one of the most important factors in the economic growth of the area is the location there of vast military installations where some of the world's most important research and development and training are now taking place.

Among them is Ft. Bliss, the great sprawling Army base. At its Army Air Defense School missilemen from all over the free world get their training. There is the White Sands Missile Range, the nation's only land-locked missile testing center, and Holloman Air Force Base.

Ft. Bliss, incidentally, is where Gen. Pershing set out for Mexico to pursue Pancho Villa after the Columbus, N. M. raid. Pershing received orders from Washington instructing him to make "all practical use," of a squadron of aeroplanes assigned to him, and the First Aero Squadron equipped with JN-2 Curtiss biplanes saw their first action in this part of the country.

El Paso has two civil airports, the International Airport on the east side of the city and a small general aviation field located on the west side of the Franklin Mountains in the Rio Grande Valley above the city. The area is dotted with farmers and ranchers' private strips.

International has grown from its original 640 acres to 5,000 acres and a five-million-dollar valuation with 250,000 airline passengers a year passing through its gates. The city is served by three airlines and is a participant in the Southern Transcontinental Airline Route case which, when decided, may permit more air carriers to operate here.

Biggs AFB is one of the Strategic Air Command's installations, flying B-52s, and KC-135s. A Tactical Air Command Tow Target squadron flies F-100s and B-57s at Biggs and another TAC outfit flies KB-50 refueling tankers.

A large Army Aviation Section is based at Biggs flying L-19s, L-20s, several types of helicopters and some twin-engined equipment.

Its mission is to furnish sup- (*Continued on page* 97)

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2

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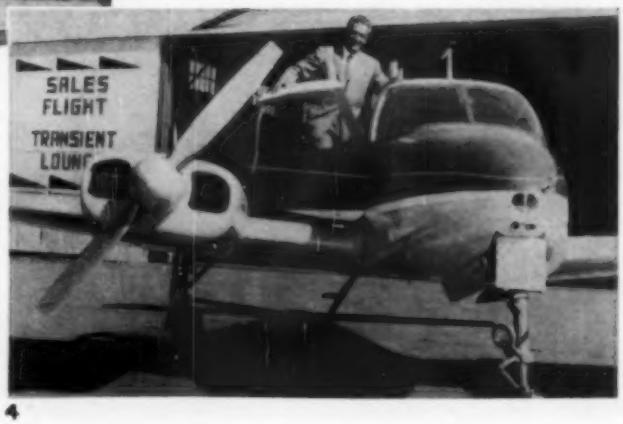


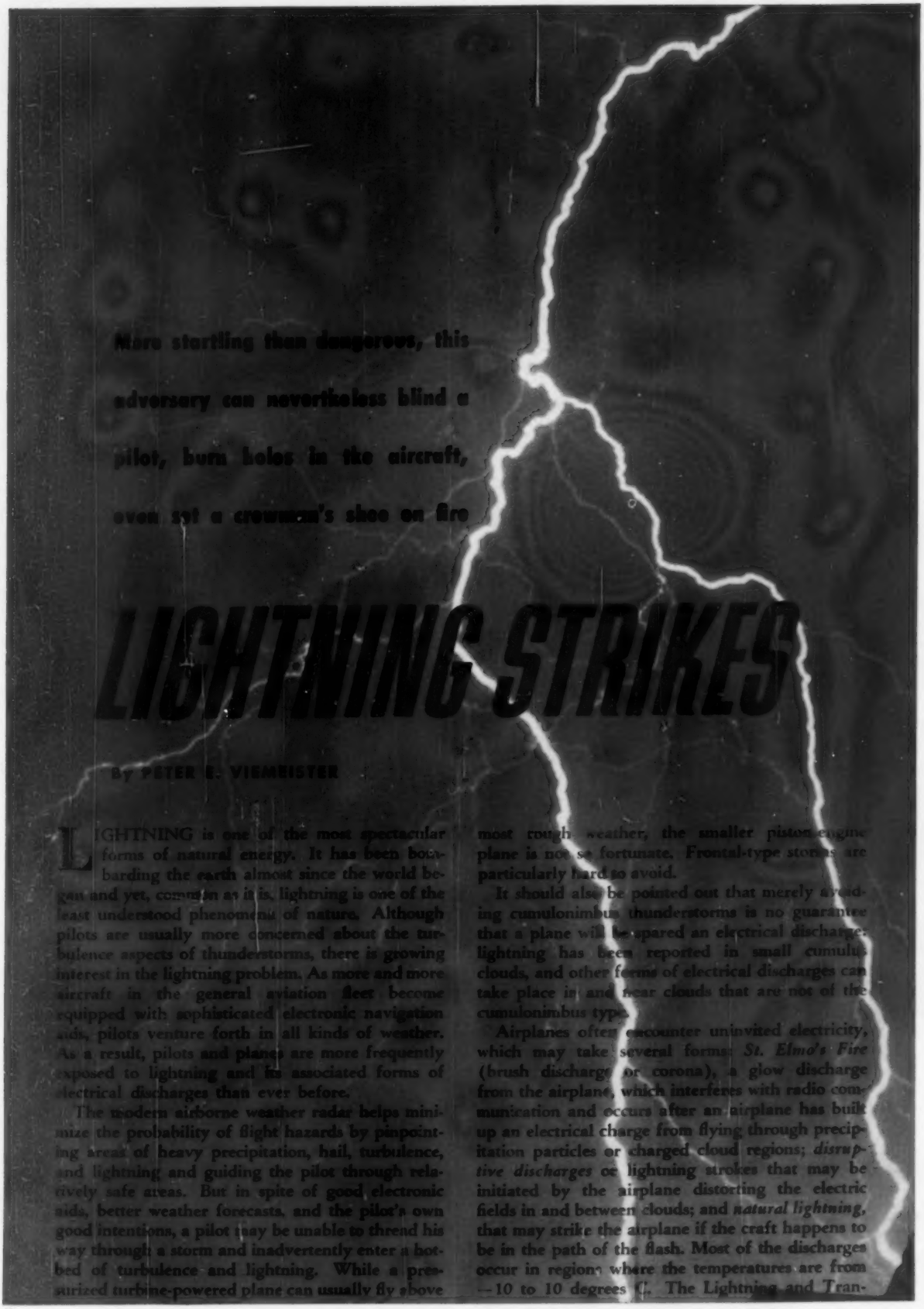
4

1
Champs Aviation sells Cessna aircraft, offers complete aviation facilities at International.

2
City-built hangar is shared by El Paso Natural Gas Co. and Northrop Radioplane, Norair Divs.

3
Office and pilots' lounge of Champs Aviation, one of the nation's top Cessna distributors.

4
Real estate developer Emilio Poinado uses his Cessna 310 both north and south of the border.



More startling than dangerous, this adversary can nevertheless blind a pilot, burn holes in the aircraft, even set a crewman's shoe on fire

LIGHTNING STRIKES

BY PETER E. VIEMEISTER

LIGHTNING is one of the most spectacular forms of natural energy. It has been bombarding the earth almost since the world began and yet, common as it is, lightning is one of the least understood phenomena of nature. Although pilots are usually more concerned about the turbulence aspects of thunderstorms, there is growing interest in the lightning problem. As more and more aircraft in the general aviation fleet become equipped with sophisticated electronic navigation aids, pilots venture forth in all kinds of weather. As a result, pilots and planes are more frequently exposed to lightning and its associated forms of electrical discharges than ever before.

The modern airborne weather radar helps minimize the probability of flight hazards by pinpointing areas of heavy precipitation, hail, turbulence, and lightning and guiding the pilot through relatively safe areas. But in spite of good electronic aids, better weather forecasts, and the pilot's own good intentions, a pilot may be unable to thread his way through a storm and inadvertently enter a hotbed of turbulence and lightning. While a pressurized turbine-powered plane can usually fly above most rough weather, the smaller piston-engine plane is not so fortunate. Frontal-type storms are particularly hard to avoid.

It should also be pointed out that merely avoiding cumulonimbus thunderstorms is no guarantee that a plane will be spared an electrical discharge; lightning has been reported in small cumulus clouds, and other forms of electrical discharges can take place in and near clouds that are not of the cumulonimbus type.

Airplanes often encounter uninvited electricity, which may take several forms: *St. Elmo's Fire* (brush discharge or corona), a glow discharge from the airplane, which interferes with radio communication and occurs after an airplane has built up an electrical charge from flying through precipitation particles or charged cloud regions; *disruptive discharges* or lightning strokes that may be initiated by the airplane distorting the electric fields in and between clouds; and *natural lightning*, that may strike the airplane if the craft happens to be in the path of the flash. Most of the discharges occur in regions where the temperatures are from −10 to 10 degrees C. The Lightning and Tran-

Laboratory tests on aircraft scale models help to indicate where lightning will connect. Extremities are hit most.

sients Research Institute of Minneapolis studied lightning damage reports for 275 airplanes struck by lightning. Approximately 30 per cent of these occurred right at the freezing altitude.

St. Elmo's fire is a visible corona glow on parts of the airplane. An airplane in flight can become electrically charged and then the charges tend to concentrate at the sharp extremities of the plane, such as the wing tips, antennas and nose or tail and propeller blades. Corona may even bathe the entire plane in light.

St. Elmo's fire usually, but not always, precedes a disruptive discharge by a few minutes to a fraction of a second and announces its presence as precipitation static in the radio and by glowing brush discharge from the nose, wing tips or propellers of the plane. The radio indicates this as a "hissing" sound that runs up and down the musical scale and makes normal communications difficult or impossible. Wing tips may glow, and the propeller disc can be surrounded by a bluish or reddish glow.

A Convair 440 twin-engine transport, flying over Nebraska on a June night in 1957, was carrying the Brooklyn Dodgers baseball team to Minneapolis when St. Elmo came to entertain them. Weather stations between Denver and Minneapolis were reporting thunderstorms, and lightning flashed so frequently on all sides that the pilot said "it was so bright you could read a newspaper." As the ship climbed to 19,000, well above the rain below, the small flickering bluish light of St. Elmo's fire played across the windshield.

These are electrostatic phenomena and do not create serious problems. The magnitude of the current in St. Elmo's fire or corona is so weak that aircraft are not damaged by this type of discharge. However, it is conceivable that if a plane is forced to lighten its load by dumping fuel because of some emergency, St. Elmo's fire might ignite the vapors and cause a fire. Aircraft are equipped with "static dischargers" that are intended to leak off surplus charges picked up during flight. These dischargers usually take the form of wicks, attached to the trailing edges of the wings and tail surfaces. The wick is a cotton rope, impregnated with graphite to make it a conductor. The idea is that the strands at the end of the wick serve as points and provide a convenient place for surplus charge to leak off.

Dr. Robert L. Tanner, while at Stanford Research Institute, developed a new static discharger that replaces the wicks with a conducting coated glass fiber rod about a foot long from which extend tungsten needles. The needles facilitate charge leakage at a point isolated from the aircraft structure where the discharge will not interfere with the performance of the radio antennas. These are now being tested on modern airliners.

A pilot can't see St. Elmo's fire in daylight, but he can hear it in his earphones. Often St. Elmo's stays for a while, then goes away. More frequently, however, it precedes a disruptive or natural lightning stroke. If the charge on the ship builds up enough, the corona begins to extend further from the airplane as a streamer, from a few inches to 10 or 15 feet long. A long streamer may be six inches wide and project forward from a propeller or wing tip like a long, forked finger. A streamer halo may (*Continued on page* 54)

AMERICAN FLYERS

THE AIRLINE PILOTS' TRAINING SCHOOL

Students from many parts of the globe learn both fundamentals and advanced techniques at one of the world's largest air universities

By JOHN SHERMAN

NINETEEN thirty eight—a second hand Stinson Reliant, one Link trainer, a small building tucked away in the corner of Meacham Field, and an out-of-work U. S. Weather Bureau pilot was the start. Today, American Flyers is one of the world's largest flying schools. With students from every corner of the globe, graduates have found their way into major airlines in the United States. It terms itself "The Airline Pilots' Training School." It has, in fact, its own airline.

American Flyers' President Reed Pigman's job as a Weather Bureau observation pilot terminated with the advent of the now familiar radiosonde balloon. Pigman, who had flown four years without missing a flight, became a victim of progress. He turned to a career best utilizing his capabilities—imparting knowledge of instrument flying techniques and procedures to embryonic pilots.

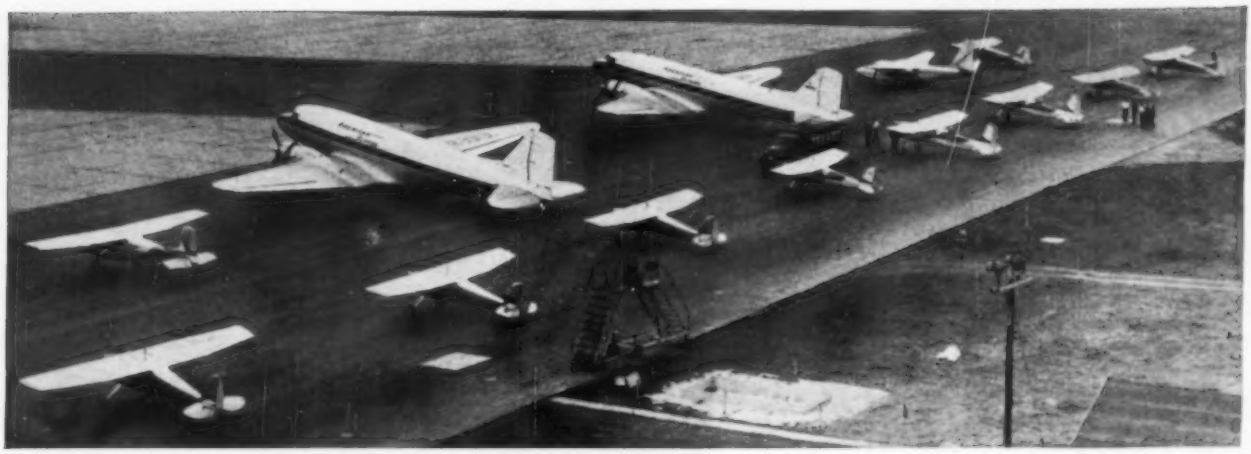
It was the case of a "better mousetrap," for airlines were quick to accept his graduates as candidates for first officer positions. The school soon became firmly established in the instrument flying training business. During WW II, American Flyers served as a training center to many major airlines to furnish replacement for the regular pilots who had entered the armed forces.

Foreign countries became aware of the American Flyers' product and the school soon became host to the subjects of many lands. Recently, at one time, students were present from Sweden, Switzerland, Japan, Guatemala, Venezuela, Iceland, Lebanon, Syria, Ecuador, Arabia, India, the Philippines, Spain, and Canada!

Language problems exist, but thus far have not prevented successful graduation. Special classes in English are conducted as required, but even this is not always the answer. On one occasion there were seven students from China; all were from different provinces and spoke different dialects—they couldn't understand English—or each other! It is times like these that personal ingenuity takes precedent. All graduated and were returned to become a part of their country's air services.

Starting primarily as an instrument flight training school, it was the foreign element which demanded the Commercial Pilot course; such training was not always

The school's main headquarters at Meacham Field, Fort Worth, Tex. Graduates now number more than 15,000, over 3,700 of these from foreign lands.



Part of the school's fleet—DC-3s, light Cessnas and an Aero Commander—at Ardmore, Okla., facilities established to cope with expansion needs.

available in the home country, and the experience is a requirement prior to starting instrument training. A positive factor to the "full treatment" is that the student is completely indoctrinated in school procedures.

The Commercial Pilot course has become increasingly popular; today, it makes up more than 50 per cent of the total enrollment. American Flyers graduates now number more than 15,000, over 3,700 from foreign lands and over 11,000 from the United States.

According to Pigman, the demand for pilots today is greater than ever before. The success and acceptance of the business aircraft and even the big jets have increased the need for reciprocating engine pilots.

President Reed Pigman

With increasing enrollment and the expanding Fort Worth community, the facilities at Meacham, though considerably enlarged, could not handle the load. Flying missions had to be carried out farther away to find suitable practice areas, and the home field frequently was a bottleneck. The problem was solved when the Air Force determined that it no longer needed its base at Ardmore, Oklahoma.

Pigman was able to secure a lease from the City of Ardmore for the facilities he required. They included an administration and classroom building, an operations building; the NCO Club, which now serves as a cafeteria and snack bar, and a huge hangar, hardly a year old. It has 103,225 square feet of floor space and a vertical clearance of 69 feet and will serve as the school maintenance center.

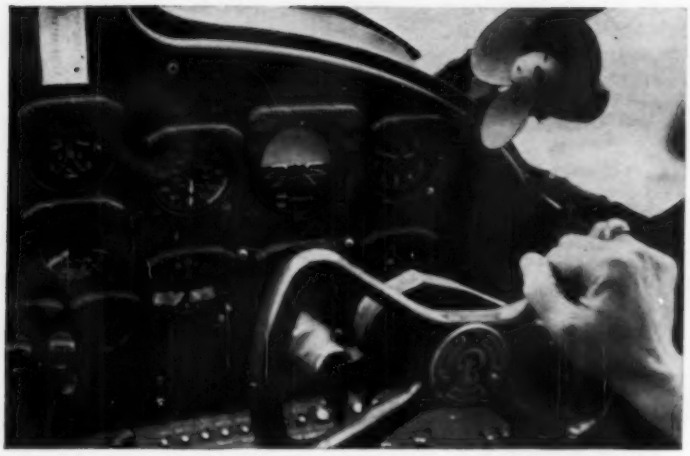
Where at Fort Worth it is necessary for the student to go to the community to seek living quarters while attending, at Ardmore former bachelor officer quarters are nicely furnished to provide quiet, comfortable housing. The cost of a shared room at Ardmore is $26.25 per month or $7.00 per week. Private rooms are available at higher cost.

The Fort Worth school is still a very important segment of the American Flyers' facilities. It is well located to utilize the vast navigation and approach facilities complex in that area—VOR, ILS, IF ranges, homers, radar, air traffic control center, approach and departure controls plus the high-density system of airways with multiple intersections and holding fixes. All are vitally necessary to train pilots properly in instrument flight procedures.

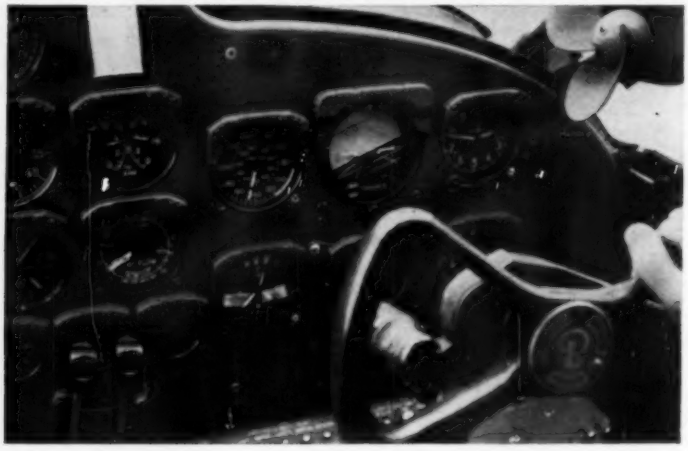
Professional pilots are trained (*Continued on page* 58)

Left: A. T. Moore, chief of ground school, explains atmosphere characteristics. *Right:* Japanese students study ADF components.

A clock-and-turn indicator and pictorial gyros are part of Garwin's answer for instrument simplicity



Mounted on the instrument panel of a Beech 18, two-tone attitude gyro stands out. Airplane superimposed on directional gyro and clock-and-turn indicator are beneath.



GARWIN INSTRUMENTS

A DIFFERENT APPROACH TO PRESENTATION

By GERALD J. SCHLAEGER

THE NEW FLIGHT instruments introduced by Garwin Inc., of Wichita, Kan. feature simplified presentation, greater safety and promise higher utilization of business and private aircraft. If the business pilot is to receive full value for his aircraft dollar, at least limited IFR capability is required of him. As more of these men seek instrument qualification, the more obvious is the need for simplification as they cannot spare the time needed for instrument practice.

According to J. F. Garufo, Garwin's vice president, the company philosophy is geared to a reliable, economical, and easily interpreted instrument flight group. They are seeking a natural presentation which will lend itself to quick learning and easy retention of instrument proficiency. Garufo says many of our present flight and navigation instruments read just the opposite of what they should for easiest interpretation.

Garwin's pictorial attitude gyro highlights the new line with its "natural" look. The new gyro enhances a VFR image in the pilot's mind through the use of parallel horizontal and radial vertical section lines on the "ground" portion of the indicator; the "sky" is off-white. Manufactured under Sperry license, the attitude gyro is modified with the parallel lines indicating 20- and 40-degree deviations from level flight. The bank index is white and is placed on the stationary portion of the indicator. Banking calibrations, also white, are for 20 and 60 degrees, and are on a movable rim attached directly to the horizon bar, putting bank indications in the proper direction. This is just the opposite of the standard instrument and is initially confusing, but you soon get used to the new "natural" presentation. At the start of the evaluation we would occasionally shallow our bank when we had less bank than desired but this was soon overcome. For the beginner, it is likely to be more easily assimilated and can be better understood.

The model flown in FLYING's pilot evaluation was vacuum-driven and had the conventional tumbling limits of 100 to 110 degrees bank and 70 degrees pitch. Electric non-tumbling and auto-pilot models will be available. Cost of the vacuum model is $200 and a trade-in program is contemplated.

Many segments of instrument flying place critical emphasis on proper timing. Exactness is required if proper wind correction is to be applied to procedure turns; holding patterns must be accurate, particularly if accomplished in high density areas; distance from the station to the field is timed on a second-hand—where is the clock? (*Continued on page* 98)

Pilots usually aren't mechanics.

But still it can pay to troubleshoot your engine before you give it up for lost

ENGINE MAINTENANCE

By TED DUROSKO

WHEN an airplane engine shows signs of malfunction, the time has come to take a close look at the normally faithful power plant and decide whether the forthcoming "surgery" is to be major or minor. Safety in the air makes it mandatory that the aircraft engine produce its rated power on the pilot's demand.

How does one go about making such a decision? The easiest and safest way for a non-technical person is to put the problem in the hands of an engine specialist able to analyze the extent of repair.

However, under some circumstances this might not be possible, especially if the pilot is flying out of some remote or private strip. The pilot-owner then must be capable of determining the probable source of trouble and deciding whether the airplane can be flown safely to a service center.

THE PRO'S NEST

This is where an accurate history of the engine will be of value. If the log book has been maintained up to date, it is an easy matter to determine total time on the engine, whether it has been "majored," "top overhauled" or flown for several hundred hours with no more than periodic checks. This information will help in deciding the extent of an overhaul to be performed while the engine is partially dismantled.

For example, if two or more cylinders must be removed to repair valve seat leakage, it might be wise to replace all piston rings at the same time. On the other hand, if the trouble is traced to a defective ignition wire, a set of pitted magneto points, or a broken valve spring, only the faulty item may have to be replaced.

Perhaps here it might be worthwhile to briefly define the key terms which play such an important part in determining the type of repair needed—namely top overhaul, major overhaul and factory exchange.

Top overhaul—For this class of repair the engine need not be removed from the engine mounts. Cowling and baffles are removed, and cylinders are unbolted and separated from the engine case. Then the rocker arms, valves, springs and push rods are separated from each cylinder.

Pistons are detached from the connecting rods and the piston pins and plugs are removed.

Following this disassembly, carbon deposit or other foreign matter are removed from all parts. Valve guides are reamed of all hard carbon. Valve faces are ground or lapped, and so are the valve seats. If the valves are warped or worn, they should be replaced. Valve guides also should be examined closely and replaced if worn.

New piston rings are fitted on the cleaned pistons and the original wrist pins are re-used generally. As connecting rod bearings are usually not touched during the top overhaul, the engine is then reassembled.

Major overhaul—The major overhaul starts the same way as the top overhaul, with the addition that the engine is removed from the aircraft, put on a stand and completely disassembled.

The case is unbolted and "split" open to remove the crankshaft, crankshaft gears, camshaft, cam followers and valve lifters. While the engine case is "cooked" in a solvent to clean out all sludge, all other parts are cleaned and then inspected for cracks or internal structural failures. This inspection usually is conducted by magnafluxing or the newer industrial X-ray technique.

Main and connecting rod bearings are replaced at this time. If the crankshaft is worn, yet within certain tolerances, it may be ground to an undersize. If the wear was too great, then it must be replaced.

New wrist pin bushings and piston pins are installed, and if the cylinders are worn beyond specifications, they are either rebored to oversize or they may be exchanged for new ones.

Engine accessories such as carburetor, magnetos, starters and generators may or may not be overhauled then depending upon their total time of use and on their condition.

Factory exchange—As the term implies, the engine is removed from the aircraft and exchanged for a factory remanufactured one. The exchange engine will have zero time and will contain standard size parts such as cylinders and pistons. It may, however, have an undersize crankshaft.

Along with the overhauled engine come overhauled accessories which sometime include spark plugs and shielded harness, in addition to starter, generator, magnetos and carburetor.

Now having a basis for understanding the key terms, we can continue to examine the engine log and other historical data. Once facts are collected and time determined between top overhaul and major overhaul (if any), a comparison can be made with the engine manufacturer's recommendations as to time when top or major overhaul should be performed.

Then this comparison should be qualified with the abuse factor. For instance, if the airplane has been used for cross-country flights (*Continued on page* 78)

NEWSREEL

NEW HELICOPTER *(Below)*. First prototype of a two-place rotorcraft developed by R. J. Enstrom Corp., Menominee, Mich. Powered by a 180-hp Lycoming, the F-28 has a maximum speed of 109 mph and a range of 274 miles. Still in development stage, with second prototype for FAA cerification to be ready in 1962. Price of the aircraft will be around $20,000.

SKYKNIGHT *(Above)*. Cessna's new light twin, scheduled for delivery in August, is powered by two Continental TSIO470-B turbosupercharged engines rated at 260 hp each. The five-passenger aircraft has a service ceiling of 27,200 feet and a single-engine ceiling of 17,400 feet. The exhaust driven superchargers permit full power utilization at 16,000 feet. Top speed is 265 mph, maximum range 1,430 miles at 25,000 feet. Basic price is $67,500.

THE BEAGLES *(Right)*. Two British light executive aircraft, first to be produced under the auspices of British Executive and General Aviation, Ltd. (BEAGLE). Top photo shows the Beagle Auster-Terrier three-place airplane powered by a Gypsy Major engine of 145 hp, priced to sell for around $5,000. Lower photo shows the Beagle Auster-Airdale, seating four, powered by a 180-hp Lycoming with McCauley constant-speed propeller. Price is $13,300.

SKYWAGON CARGO-PACK *(Left)*. Designed especially by Cessna for installation on their Model 185 utility aircraft, the external fiberglass carrier increases the Skywagon's cargo area by 21.5 cubic feet. The Cargo-Pack is 9 feet long and 31 inches wide. Normal loading door is located on the left side and an additional one, for carrying long objects, is in the rear. Maximum speed of the airplane with cargo container is 170 mph, takeoff and landing distances are not affected. Pack is available as factory installed equipment or as accessory from the Cessna dealers.

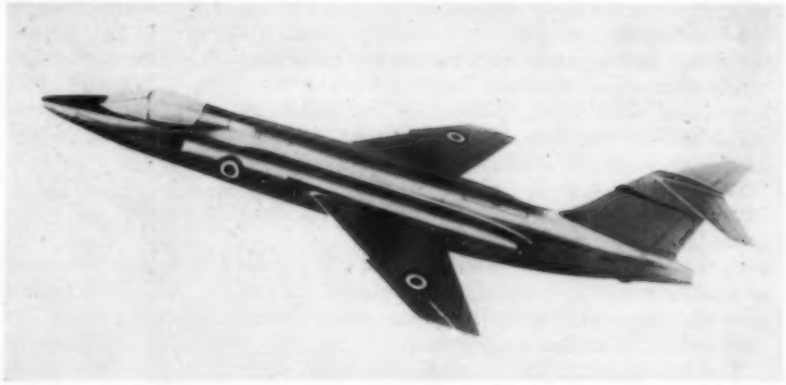
NEWSREEL

FAA 720 *(Right)*. Scheduled to go into service with the Federal Aviation Agency soon, the Boeing 720 will be utilized for training of safety inspectors and study of air traffic problems in connection with jet airline operations. The FAA's 720 is powered by four Pratt & Whitney JT3C-7 engines rated at 12,000 pounds of static thrust each, has a ceiling of 42,000 feet.

STINGER APU *(Above)*. Auxiliary power unit for engine starting, warm-up, ground air conditioning and other support needs, developed by AiResearch Aviation Service for the Napier turboprop powered Convair 540s. Units will be used on all Allegheny Airline 540s and Napier-powered Convairs modified by Canadair.

BAC 111 *(Below)*. To be put into immediate production by British Aircraft Corp., this medium-range jet airliner is slated to succeed the Vickers Viscount turboprop. The aircraft is capable of carrying 69 tourist passengers at 540 mph, is powered by two Rolls-Royce Spey turbofan engines that are rated at 9,850 lbs. thrust each.

FIAT G.95 *(Right)*. Design study of Italian S/VTOL tactical fighter based on FIAT patents for composite propulsion utilizing conventional turbojet power for normal flight regime and short life engines (rockets) for vertical flight. The aircraft has been projected in three configurations, two as STOL and one as VTOL.



TRI-GEAR TWIN BEECH *(Left)*. Tricycle gear conversion for C-45 and D18S Beechcrafts by Volpar, Inc., of Pacoima, Calif., has been certified by the FAA. Modification involves installation of nose gear and moving main undercarriage pivot points 28 inches to the rear. Converted aircraft are certificated for landing gear extension at 160 mph. Cost of Tri-Gear, including the installation, is $24,500.

There are ways to avoid the unpleasant effects of that universal flying malady

MOTION SICKNESS

By JOHN T. FLYNN, M.D.

MOTION SICKNESS is by far the most frequent discomfort experienced by the airman during flight. Depending on its severity, it may be only annoying or discomforting, barely tolerable, or completely incapacitating. It can be a serious threat to flying efficiency in turbulence and instrument conditions when peak skill is badly needed.

Airsickness is caused by continued motion-stimulation of the tiny utricle portion of the inner ear which controls equilibrium. The condition begins with a progressive loss of desire for food, followed by increased flow of saliva and by sweating, later by vertigo, nausea, and headache, finally by vomiting.

When vomiting occurs within the first few minutes, complete recovery frequently occurs with equal promptness. In general, the longer the time needed to reach the stage of vomiting, the longer the time required for full recovery from motion sickness—sometimes many hours after the end of the flight.

The motion which causes airsickness most easily is one which produces an up-and-down movement of the head along its vertical axis. Pitching and heaving movements of an aircraft cause motion sickness more quickly than rolling movements. Slow oscillations of large amplitude cause it more easily than rapid to-and-fro movements; periodic or moderate accelerations more easily than quick accelerations.

Individuals vary enormously in their susceptibility to motion sickness, though all persons become ill when the going is rough enough. Young men age 17 to 19 are three times more susceptible than men 30 and older. Women passengers and half-grown children are five to 10 times more prone to airsickness than the adult male; children under two years seem completely resistant.

With repeated exposure to flying conditions, nearly all persons can improve their resistance to airsickness; 10 per cent of World War II trainees became ill at some time during their first 10 fights, yet only about one per cent failed to develop resistance to airsickness.

Many other factors help to determine whether pilot and passengers will develop motion sickness. The atmospheric turbulence depends on local weather conditions, the season of the year, and the proximity of mountainous terrain. Certain types of aircraft, especially military gliders, are liable to produce motion sickness easily.

The individual's location in the aircraft is important—the nose or tail of an aircraft which is "hunting" or yawing can be extremely distressing positions, due to the lateral accelerations, while a position close to the center of gravity of the airplane may relieve the symptoms of motion sickness effectively. Rotary acrobatics and a corkscrew type of flying pattern can give rise to airsickness; the same is true during an approach for a landing, especially after a long flight, and when a turn is made while flying fairly close to the ground.

What is going on in the field of vision has a marked effect on airsickness. Poor orientation in space because of insufficient visual contact with the earth tends to bring on or aggravate motion sickness. This is well illustrated by experiments using the "witch house," an amusement park device where the subject, the chair and the floor remain stationary, while the walls and ceiling revolve on a horizontal axis.

The subject experiences the optical illusion that he is rotating and can become violently ill with nausea and vomiting, without undergoing any actual motion at all. The same occurred with the Navy's 2-FH-2 helicopter simulator; though the cockpit never moved, the simulated movements of the projected surrounding "landscape" caused the most experienced instructors to become ill so often and so persistently that use of the simulator had to be discontinued permanently.

Eighty per cent of airsickness among bomber crews during World War II occurred among the men who occupied the navigator's compartment, where they were unable to see outside the aircraft and unable to orient themselves in space by visual means. Their motion sickness could be relieved by moving to the pilot's compartment or to the nose, where the horizon or ground objects were visible.

Experienced pilots rarely become ill from motion when flying an aircraft, but often do when riding as passengers, in large part because they then cannot keep good visual orientation with the surroundings. Steady exact visual orientation in space is an extremely effective suppressant of airsickness.

However, a view of the surroundings does not guarantee such improvement, and in fact may aggravate the condition of airsickness, if the individual fails to focus his eyes on a fixed point but rather lets the landscape and sky "swim" past his vision. The lessening of airsickness during night flying may be due not only to smoother air at night, but also to the inability to let outside objects "swim" across the field of vision.

Another condition which (*Continued on page* 94)

Filled, seeded and mowed by hand, this 2,200-foot grass strip is increasingly important to Bellville.

Airstrip Pioneers

One man's desire to lift away from the grass meant a new airport for a little Texas town

By ORLAN AND WINI JONES

TO TEST his homemade gyrocopter, Henry Grawunder Jr. of tiny Bellville, Texas, cleared a 1,200-foot strip on his father's farm just at the edge of the city. The gyrocopter flew, a little wobbly to say the least, but the biggest surprise came when airplanes started landing on the small strip.

Henry Grawunder Sr., an affable, soft-spoken individual, added the next touch when he took to moseying across the pasture to greet the pilots who landed their aircraft there.

That was in the spring of 1958, and before father or son knew it, they had turned half of their 85-acre farm into an airstrip which now is rapidly becoming an important part of the future of Bellville, a town of just 2,000.

Now on the Austin chart, Grawunder Field attracts business planes, tourists, cattlemen, salesmen, lawyers representing clients before the Grand Jury, and weather-wary pilots in need of a place to land in an emergency. The Grawunders' willingness to provide this vital service has turned them into airstrip pioneers.

Henry Grawunder Jr. test-flying his gyrocopter.

The only outside help given to Grawunder Field was in the form of some old culverts from the county to span a swag in the hilly landscape, and sand from a city excavation project to cover a muddy area. The city also sent an idle maintainer to help level the sand. In addition a Gulf Oil Corp. consignee has stationed a gasoline truck at the field.

Other than that, Grawunder Field has been strictly a private endeavor by a couple of air-minded citizens who think that every town—of whatever size—should have an airstrip.

Henry Sr., though not a pilot himself, has been instrumental in the development of the field. When planes began setting down on the inadequate gyrocopter strip, he worked with his son to install the original 44 feet of culvert and fill to lengthen the field to its present 2,200 feet.

In the past two years, he has hand-planted grass on the strip and worked with Henry Jr. to keep it mowed. Henry Sr. also helped soothe his cattle, which still graze on the 40-acre plot where the strip is located. But the animals now move obediently out of the way when buzzed. END

NO. 254

I learned about flying from that!

Trapped on top with his wife and children, he learned the wisdom of turning back

By JACK P. RENCHER

HOLBROOK is not very big, or pretty, but it is picturesque. It sits like a misplaced movie set beside the muddy little Colorado River on the red windswept desert of Northeastern Arizona.

The airport on the mesa above town is about what you would expect or maybe a little better. There was one adequate graveled runway, one abandoned looking hangar and one lonesome gas pump.

As my Bonanza's wheels left that graveled runway one Sunday morning in July 1956, it inaugurated one of the most stupid days ever spent in my life.

My wife and I had been planning a trip to Connecticut with our two copilots (age three and seven), for several months. My early model Bonanza was old and slow for a Bonanza, but well equipped for a country boy. There was a low frequency transceiver, an economy model VHF with omni plus a full panel. I had only a private license, but I had two or three good instrument courses while in the Air Force and lots of actual instrument time while flying B-17s in England during the war. That saved the lives of four people and one Bonanza.

I rarely used the transceiver—the VHF was too handy—but the omni needed calibration. The local radio man in Boise was good. He could calibrate it for me. I left it with him for three months before my trip. He kept my radio two months, and then decided the factory could do it better. When I left for Connecticut, my VHF was in Pennsylvania. So what? I had 3,000 hours of cross-country and a good low frequency set. But as Boise, the city of trees, faded slowly behind us the low frequency radio faded instantly.

I stopped at Salt Lake City and had the radio fixed. It worked just long enough to get the gear up. My next stop was Holbrook. They had no radio men, no maps, and no weather station, all of which I was well aware of, but they had gas, and I wanted to visit a relative there.

After a two-day visit, I pointed the sleek nose eastward, with Connecticut or bust on my mind. I would stop at Gallup, N. M. and get a map, and the weather report, and the first chance I got, have the radio fixed. Gallup had the maps. I could get the radio fixed at Santa Fe. The weather man said it would be okay into Santa Fe. Maybe a scattered thunderstorm or two, but nothing I couldn't go around.

He was so right. There was one scattered thunderstorm, it was a big one, and right under the middle of it was Santa Fe, but Las Vegas had a good airport, and it was just over the hill. I'll not wait for this thunderstorm to move on, I'll not go to Albuquerque, which I could see clearly to the south. I'll keep heading to Connecticut. I can get this radio fixed someplace up the line. I have enough gas to go to Amarillo or Dalhart if I have to.

My wife was ignorant about flying weather. She was anxious about the solid cloud deck under us. I assured her it was just the scud from the thunderstorm, and would become broken or scattered as soon as we were past the range of mountains. As my ETA to Las Vegas faded into history, my mind turned to the blue sky over the runways of Albuquerque only 40 minutes away. But heck, it was the wrong direction, Connecticut was east. As soon as we got over the plains of Texas, the clouds would break, and we could go down through a hole and land at Amarillo in the Texas sunshine.

I plotted a careful DR (dead reckoning) course to Amarillo from my last known position. I carefully calculated an ETA to Amarillo, kept one eye on the compass and the other on the cloud deck below me to spot the hole that was surely just ahead.

The tops of the clouds pushed me higher and higher. My altimeter said 14,500 feet. The blue lips and nails of my sleeping son verified its accuracy. The anxious look on my wife's face reflected the look which must have been on mine. She said nothing, not from fear, but to let my good judgment work uninterrupted. My ETA to Amarillo was 30 minutes away. The fuel gauge said "you can't go back." I will have to be down someplace within an hour. I must not overshoot Amarillo. There is nothing on the other side. I hadn't had an altimeter setting in nearly three hours, and that was over 300 miles back. I was doing DR for over two hours without a wind and there was only one way to go, and that was down, but into what?

The map shows the ground under where we thought we were to be about 4,000 feet. (*Continued on page* 88)

Pacific Air Lines says:

"ACs are the most satisfactory All-Weather Spark Plugs we have ever used"*

Pacific Air Lines flies routes that cover the golden West from Las Vegas to Portland. These flights take their planes through all types of weather—through the widest ranges of temperature and humidity. This kind of operation severely tests spark plug reliability. On its Martin 404s—the mainstay of its piston fleet—Pacific uses AC Aircraft Spark Plugs exclusively because "ACs last longer and require less maintenance than any other spark plugs we have used."

ACs deliver superior performance in all aircraft operations. They feature the exclusive recessed insulator tip that heats faster to reduce fouling, cools faster to prevent pre-ignition. Their copper-cored electrode provides fast heat dissipation and is fully jacketed with nickel alloy for longer service. The famous AC cloverleaf ground electrode provides the optimum in long life and anti-fouling characteristics.

AC Aircraft Spark Plugs will work for you as they do for Pacific Air Lines. It will pay you to specify them for your planes.

AC SPARK PLUG ⚛ THE ELECTRONICS DIVISION OF GENERAL MOTORS

DISTRIBUTED BY: **Airwork Corporation • American Avitron, Inc. General Aircraft Supply Corporation • Mid-Continent Airmotive Corporation • Pacific Airmotive Corporation • Southwest Airmotive Company • Standard Aero Engine Ltd. • Van Dusen Aircraft Supplies, Inc.**

*"Our operation is especially tough on spark plugs," reports Art Ludt, Superintendent of Engine Overhaul, shown here (right) with Head Mechanic Walter Crow, "because in addition to severe climatic changes, our flights average only 42 minutes and this means a lot of take-offs and landings."

Aircraft Care starts with

AC

AIRCRAFT SPARK PLUGS

Lightning

(Continued from page 43)

envelope the nose or engine nacelles. When the streamer appears, the pilot should prepare himself for a more brilliant discharge or lightning stroke that has been "triggered" by the airplane.

The mere presence of a metal airplane can trigger a lightning flash that might not otherwise occur. If a good long conductor, like the wing of an airplane, is inserted in a strong electric field, the field is distorted and may increase to the point needed for a cloud-to-cloud discharge.

The effects of intercepting a natural lightning stroke are similar to those of a disruptive or triggered discharge, but may produce greater damage because greater currents and longer discharge times are involved. The airplane's crew may not know whether their ship has been struck by natural lightning or has taken part in a disruptive discharge. A plane flying underneath a thundercloud may find itself in the path of a cloud-ground stroke, but more commonly a plane in or between thunderclouds may find itself offering a cloud-to-cloud stroke an easy path between the charge centers of clouds.

Frequently lightning travels the long way on an airplane. Since the airplane is a better conductor than air, the lightning tends to travel as great a distance as possible on the plane before continuing through the air to its earth or cloud destination. Many incident reports show that lightning travelled from the nose to tail or from wing tip to wing tip. The exact route, of course, depends upon how the airplane is oriented in the electric field at the time of the stroke.

Lightning can hit an airplane more than once on the same flight. A European airliner was slightly damaged by two separate strokes over France in 1958. On another occasion a four-engine Air Force transport was hit twice within 15 minutes.

Airplanes can and do get hit by lightning. What effect does this have?

Protruding antennas are frequently damaged. Other popular lightning damage areas are the wing tips, ailerons, elevators, rudder, and fuselage nose. The damage to metal parts usually takes the form of small burns, pitting, or holes.

A Lockheed Electra, flying at about 9,000 feet in 1960, was struck by lightning while turning near Boston. More than two dozen burn marks were found on the fuselage and almost a dozen on the radome. The structure was apparently magnetized because the compass failed to operate properly after the strike. Radio equipment was unaffected. A month earlier a Boeing 707 was coming into New York from the southwest when lightning damaged the leading edge of the vertical fin. Infrequently the plane's magnetic compass is thrown out of whack. Steel and iron alloys are used in various parts of modern aircraft structures, and an electrical discharge can cause these to become magnetized. A Boeing 707, en route to Hong Kong, was struck by lightning in 1959. The steel of the windshield apparently became magnetized, causing the magnetic compass to give erroneous readings of about 45 de-

(Continued on page 56)

THE THRUST LEVER

By CAPTAIN DAVE KUHN

Jet Age Pilot

IT IS HARD to pinpoint the differences between the early airline pilot and the modern one. They both can boast of having only one head, two eyes, two hands, two feet and one rear end to sit on. There are no clear cut signs of physical evolution.

In the early days of airline flying, some very kind and romantic writers created an image of a pilot that is quite acceptable. Pilots were described as, "tall, bronzed young airmen—with steely eyes and firm-set jaws." A pleasant picture to be sure, but, alas, this is only a myth for most of us moderns. A look into a mirror is apt to reveal a short, pasty, balding character that (without glasses) is never sure all three chins are clean shaven. This change cannot be classed as evolution. It is only that the average age of airline pilots has grown with the Industry.

I believe that the days of the fabric ships and iron men did have a heartier breed doing the flying. Men like Eddie Rickenbacker, George Rice, Leon Cuddeback, Dave Behncke, "Sonny Boy" Hall, Danny Medler, plus others, gave a fledgling industry the vision and courage needed to survive. 'Tis true, the swashbuckling, flamboyant, "give 'er hell" pilot has all but disappeared from the scene. They are no longer needed since ATC makes most of the decisions. CAR has rules that will cover any flight situation—including taxiing.

FAA proficiency checks, and company proficiency checks grade only on conforming to the book. Any individual technique not found in the book is frowned on to say the least. Hence the modern pilot's greatest concern is keeping legal, since any deviation from the bales of regulations would invite a fine or loss of license.

The early pilot, of necessity, was more daring since the "crate" he flew was extremely limited in power and performance. His navigational aids were few. When the weather was bad he ofttimes canceled his flight, or later wished that he had. He could, however, use any good cow pasture to sit down in until the weather cleared.

Today's pilot does not have such a simple choice. He flies in almost any kind of weather because of the very fine equipment at his disposal.

The complexity of his machine, coupled with traffic bottlenecks, require, by far, greater precision flying than was required of the early birdman. Jets do not make graceful cow pasture landings either. The reliability of scheduled operations has become the expectation of the customers. The customers as well as the mail must go through.

Probably the most noticeable difference in today's pilot is a total lack of esprit de corps. Oldtimers liked to engage in hangar flying at layover points. Each tried to out-do the other in hair-raising tales. Today no such sport is engaged in. Should any actual or imagined account of an incident reach the alert ears of the FAA, the intended effect would be lost.

Also, it must be admitted, the oldtimer had a greater concern for the well being of his company. For instance, in the early thirties, the pilots of Trans World Airlines, (then Transcontinental and Western Air) went on half pay for several months, enabling the company to buy some DC-2s.

Another airline gave stock as part payment of wages to its employees. Today this spirit is completely missing. Even if the pilots were willing, it is doubtful that the union bosses would permit such dalliances with the provisions of the working agreements. It might put a crimp in the dues collection machinery.

Airline operations are now big business. Union-management conflict has replaced the camaraderie once enjoyed. The jet, while loved by the pilot, has been largely the source of his disenchantment.

Roughly speaking a jet is over thirty-two hundred per cent more productive than a DC-3. As the companies convert from piston-driven equipment, they lay off pilots. Hundreds have been furloughed. Hundreds have been reduced in status. One pilot reporting to his operations office to celebrate the awarding of his twenty year pin, found a notice in his mailbox displacing him to copilot.

Be all that as it may, and more too, I must string along with the modern pilot. He is not dashing, daring or colorful. He has little concern for anything or anyone outside his immediate sphere. He is a rigorously trained, regimented, skillful technician. Be not deceived by bald heads and bifocals. His lackluster is offset by his skill. He can fly. He has made air travel the fastest, smoothest and safest way to get there. The public is well served.

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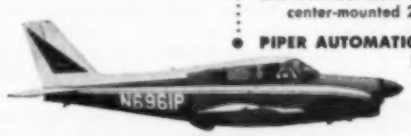

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(Continued from page 54)

grees. The discharge did no other damage.

Light gauge skin can have holes burned in it, and this has led to studies to determine the lightning hazards to aircraft fuel tanks. In 1958 J. D. Robb and his associates at the Lightning and Transient Research Institute in Minneapolis subjected aircraft tip tanks and pieces of aluminum skin to simulated natural lightning and concluded that planes with thin wing fuel tank skins should use fuel tank liners and/or lightning diverter rods or conductors to avoid possible concentrated heating or burn holes near the tanks.

NON-METAL airplane parts, such as plastic radomes, have high resistance and are vulnerable to more intense heating from a lightning stroke.

Radomes are made of non-metallic material to permit the radar beam to pass through the dome. This non-conducting radome is most vulnerable to lightning damage and may be heated so intensely by a heavy lightning discharge that it may explode or have holes torn in it. A MATS C-124 Globemaster, 50 miles from Tokyo on a flight to Wake Island in 1957, experienced a disruptive discharge that tore a jagged hole about 14 inches in diameter in its nose radome. At the point where the fabric-reinforced plastic radome joined to the metal fuselage a number of fused areas, about one-half inch in diameter, were found. The rest of the aircraft was undamaged.

Aircraft engineers have developed new ways to maintain the radome's ability to pass the radar beam and still provide a conducting path for lightning. Douglas Aircraft Company developed a solution that uses several thin strips of aluminum taped to the outside of the radome, running from the nose of the radome aft to a point where they make electrical contact with the metal fuselage of the airplane.

The strips, just three-eighths of an inch wide and only .003 inches thick, vaporize when lightning passes through them, but this creates an ionized path that carries the lightning charge safely past the radome. The lightning completes its trip before the ionized metallic vapor is blown away.

Douglas engineers believe that it is improbable that on the same flight two lightning strokes will come from the same direction, but they feel that it would probably be diverted to one of the remaining conductor strips. Lockheed uses this same concept on the nose radome of the JetStar.

A lightning stroke can have several effects upon a pilot. He may become upset—particularly if he has been flying through a turbulent area and is tense from the violent rock and roll of rough drafts.

The brilliant lightning flash can temporarily blind a pilot, particularly at night when his eyes are keyed to darkness. One crewman was blinded for eight minutes, but perhaps 10 seconds is par. Official investigations blamed the fatal 1940 crash of a DC-3, on a training flight over Lovettsville, Virginia, on a nearby lightning flash that blinded the crew. This is the only crash of a U. S. airliner on record that points the finger of blame on lightning. Today's pilots, when flying near lightning areas at night, wisely turn up the cockpit lights and keep their eyes down away from the windows. Some pilots even use special sunglasses under these conditions.

On rare occasions the pilots inside an all-metal airplane have felt electrical effects of a lightning strike. A few pilots have reported sparks in the cockpit, and one pilot felt a mild shock in his hands and feet when the airplane nose took in a brilliant flash. The copilot of one plane got a slight shock in his hand as he was touching a metal portion of his seat. The Miami Herald reported in February 1959 that a crewman sitting up forward in the clear plastic nose of a Navy P2V patrol bomber had his shoe set on fire when lightning hit the plane.

This anti-submarine bomber was flying at about 7,000 feet near San Francisco when lightning struck. The bolt evidently hit just below the plastic bubble, and part of the current passed up the man's right leg, along his back to his shoulder where it passed into the metal seat. The man, an aviation machinist's mate, was reported by the Herald as saying, "I didn't know what hit me. I didn't see a flash or anything. All I know, my feet hurt all of a sudden and I looked down and saw my right shoe burning." The lightning sheared off the heads of a few rivets and damaged the plane's tail, but the pilot brought the plane safely into Alameda Naval Air Station where Navy doctors treated the crewman for minor burns and shock. It is possible that if he had been in another part of the airplane, surrounded by metal structure as were his crewmates, he would not have been hurt. An all-metal aircraft, like an all-metal automobile guards its occupants by enclosing them in a conducting "Faraday cage."

Serious thunderstorm accidents are rare. Each year the scheduled airlines in the United States make millions of flights and yet, during the 14-year period between 1940 and 1953, for example, just nine passenger-carrying airplanes crashed because of thunderstorms. A total of 243 people perished in the crashes—less than the number killed in automobiles on a single Fourth-of-July weekend.

ACTUALLY, the greatest hazard to a plane that flies through a thunderstorm is not lightning, but turbulence. Thunderstorm hail is also a problem. An airplane travelling at several hundred miles per hour can be battered by impact with hail. Lightning is one of the lesser problems that face the pilot who strays into a thunderstorm. Lightning can damage a plane, confuse or blind its pilot and disrupt its communications with the ground. But the Civil Aeronautics Board reports it has no conclusive evidence that any U. S. passenger-carrying airliner has ever been made to crash because of lightning.

The NASA has concluded that "the damage from electrical discharges in the case of aircraft with electrically conducting skin, and all metallic parts well bonded, is ordinarily not of a serious nature."

This article is based on and excerpted from a chapter in The Lightning Book, written by Peter E. Viemeister and just published by Doubleday & Company at $4.50. Permission of Doubleday is gratefully acknowledged. END

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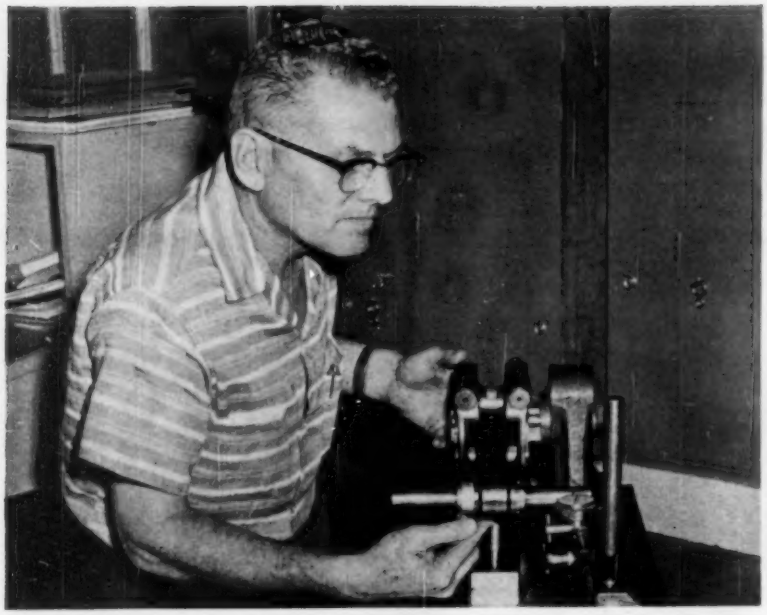

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American Flyers

(Continued from page 45)

mostly at Fort Worth. This includes refresher courses, multi-engine ratings, ATR and type certificates. The pace here is somewhat stepped up to get the student through as soon as possible. The tempo permits an instrument certificate to be obtained in three weeks, while at Ardmore four weeks is required. This does not mean that everyone should try for Fort Worth to finish a week earlier, for unless the student has adequate background to absorb the material at the accelerated rate, the pace will be too fast.

For the student at either base who cannot keep up, additional time is offered free if the difficulty is academic. With classes starting weekly, he merely may drop back a class or re-attend the areas in which he failed or was shaky.

If, however, the deficiency is in flying, additional flying hours may be purchased on an hour-to-hour basis until certification is attained. There is no limit to the amount of time the student may purchase, but additional time is the exception rather than the rule. If the student simply can not make the grade, certainly he is afforded the courtesy of frank and impartial counsel.

The Commercial Pilot course is the longest and most comprehensive offered at American Flyers. Since the opening of Ardmore, it has largely been conducted there. It consists of 165 hours of ground school including 15 hours CAR, (Civil Air Regulations) 30 hours navigation, 30 hours radio navigation, 30 hours meteorology, 30 hours theory of flight, and 30 hours engines. Five hours synthetic trainer and 161 hours of flight time lead to an FAA Commercial Pilot certificate at graduation.

The course is flown primarily in Piper Cubs and Colts and Cessna 150s, and five hours of Cessna 170 time is included for higher horsepower experience. The total cost of the course is $2,400. Students with previous flying experience may go through on a proficiency basis with an appropriate reduction in cost, if warranted.

The instrument course was the first offering of American Flyers; it is still their pride and joy. It is refered to as the "junior ATR" since it encompasses the same material, only a lesser degree of proficiency is required for graduation. The course consists of 15 hours synthetic trainer time, an 80-hour ground school including 20 hours navigation, 15 hours meteorology, five hours CAR, 15 hours radio, five hours orientations, five hours ADF (automatic direction finding), five hours chart reading, five hours Morse code, and five hours ATC (air traffic control) procedures. The flying portion is 15 hours and the cost is $625 if taken in the Cessna 170 or $670 in the 180.

Additional time in the 170 is $22 per hour and $25 in the 180. The student must have a minimum of 200 flying hours, 100 of which must be in command and 50 hours cross-country. An FAA instrument rating is awarded on graduation.

The Airline Transport Rating is the highest awarded by the FAA—it is required by all airline captains. Its prerequisites are a minimum of 1,200 flying hours in the past eight years, of which 250 must

(Continued on page 60)

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(Continued from page 58)

be in command and 500 hours cross-country. One hundred must have been flown at night with 25 of these in command; 75 hours instrument time is required and the applicant must be at least 23 years of age and able to pass a Class I physical examination. In addition, American Flyers requires their ATR aspirants have a current instrument rating.

The course gives 10 hours in the synthetic trainer and 90 hours of ground school consisting of 15 hours radio, 10 hours CAR, five hours ADF, five hours radio range orientations, 10 hours chart reading, 15 hours meteorology, five hours ATC precedures, and 20 hours navigation. Thirteen hours flight instruction is given. Four to five weeks is required for completion and the cost is $560 when taken in the Cessna 180, $982 in the Lockheed 12, $1,242 in the Aero Commander and $1,860 in the Douglas DC-3.

Recent additions to the American Flyer courses have been the Flight Instructor course and the company pilot refresher courses. Cost of the former is $575 which includes 25 flying hours of dual instruction and necessary ground school to pass oral and written examinations—an FAA Instructor certificate is granted at graduation.

Company pilot refresher courses are flexible; a one week course consisting of five hours synthetic trainer time and five hours dual instruction in the student's own plane with an intensive ground school will cost $360, and if extended to two weeks, doubling all areas, the cost goes to $595. The purpose of these courses is to bring the company pilots abreast of the latest developments in commercial and airway flying.

An entirely new course is the instrument pilot instructor course which addds the instrument capability to the student's instructor rating. Comprehensive ground school plus 15 hours dual instruction in the Cessna 180 cost $525.

IN any flying school, the instructor cadre, academic and flight line, is the backbone of the school. In this respect, American Flyers is extremely strong. Each instructor is a specialist in his own field. All are American Flyers graduates and those connected with instrument flying are airline qualified. It is common for a pilot to be puiled off the American Flyers' Airline and utilized in the instrument flight instruction department.

The American Flyers' fleet consists of airplanes ranging from J-3 Cubs to four-engine Lockheed Constellations. They include Piper Colts, Cessna 150s, 170s, 180s, one Lockheed 12, an Aero Commander, DC-3s and four Lockheed Constellations. The latter are used in airline service, which is run at present on a charter basis. In the mill, however, is an expected run on a scheduled basis to the west.

While the instrument training is conducted largely in single-engine aircraft, Pigman pointed out that a high degree of flight planning and thorough scrutinization of the weather picture was necessary before using such aircraft in actual weather. It would be advisable to operate when possible in an "on top" condition and with a reasonable ceiling below the cloud deck. Present engines have an unimpeachable record of reliability but, nevertheless, they do on infrequent occasions malfunction. Engine failure occurring with a 500 to 1,000 foot ceiling below the clouds will in most cases permit the pilots to maneuver for a safe landing. Certainly, accurate knowledge of position is a must.

Of even more importance is the minimum electronic equipment necessary for safe instrument flight. Here all too frequently the inexperienced pilot takes off with a single VHF combination communication-navigation radio into solid IFR conditions—this simply is not enough. Pigman feels the minimum equipment must include: dual omni, one with ILS localizer capabilities, one ADF, a marker beacon receiver, a glide slope receiver, a strong VHF transmitter and a standby VHF transmitter. This gives the pilot a fair coverage of the facilities. The next requirement is that he be able to use them!

American Flyers has come a long way in its 23 years of operation. Purchase of several new aircraft is planned to add to the fleet and to replace outmoded equipment. Acquisition of a jet synthetic trainer is also planned to teach the students problems common to that type aircraft. A rebuilding of the Fort Worth facilities and the development of the newly acquired facilities at Ardmore should keep this advanced flying school in the aviation picture for many years. END

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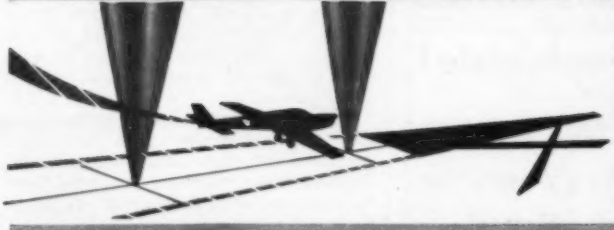

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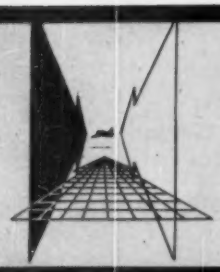

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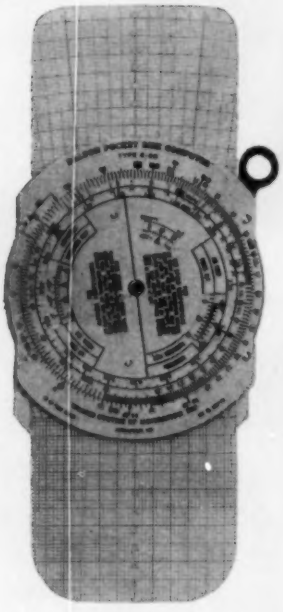

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Kaman Huskie

(Continued from page 31)

rotor (minimum clearance with the rotor turning is eight feet—fore and aft clearance is almost 13 feet) facilitate in landing the helicopter in rugged terrain.

An evaluation landing into a swampy area with high trees and brush that would have been restrictive to any rotorcraft this pilot has flown was accomplished handily in the 43B.

Hovering to take advantage of the prevailing wind, the counter-rotating blades clear the smoke and flames from the fire fighting crew. This gives them a working base for their foam path to the aircraft.

The synchropter design facilitates hovering at any angle to the wind, and has performed in velocities up to 55 knots.

The rubber fuel tank located under the cabin floor holds 198 gallons of JP-4 and gives the 43B a normal mission endurance of 3.2 hours.

The fire rescue technique has been demonstrated in spills of 1,000 gallons, but actual incidents such as the rescue of eight crew members from a flaming Air Force B-52, at Larson, AFB, Washington, more than attest to the value of the system.

Description—The 43B's distinctive configuration consists of two inter-meshing rotors, mounted on twin pylons, forward and above the engine and over the cabin area. (These pylons are slightly wider apart than on the A model.)

At the rear of the stubby fuselage is a "floating tail" supported by twin tail booms that extend aft from both sides of the cabin. This empennage section consists of a fixed horizontal stabilizer, a movable horizontal elevator and trim tab, and four vertical fins. All provide additional control and stability.

Located between the tail supports is the extended engine tail pipe, that gives a minimum of 40 pounds of additional thrust during powered flight.

Entering the roomy cockpit bubble is facilitated by sliding doors on either side adjacent to the comfortable, non-adjustable pilot and copilot seats. The cabin area has an attendant's sliding door on the right side and the two hinged clam-shell doors located at the rear.

Evaluation—The rapid starting sequence is fully automatic and usually activated by the ship's own nickel-cadmium 28-volt fully enclosed battery. Although provisions have been made for use of an external power source, the battery is capable of three or four consecutive starts and can be fully recharged by the generator in 20 minutes of rotor time.

Once the spring return starter button on the pilot's collective pitch lever was depressed and a light (start) was indicated, the rotor brake was released and the throttle advanced from its starting position of flight idle to full open.

A caution light panel at the forward end of the console spells out malfunction or unsafe conditions, and what they are, at a glance.

In handling the 43B on the ground, such maneuvers as backing up and turns in limited areas are routine. The two nose wheels have swivel locks while the aft

(Continued on page 64)

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INDIANA TECHNICAL COLLEGE

(Continued from page 62)

wheels are provided with disc-type hydraulic brakes, controlled individually at the top of the pilot's directional control pedals. Wheel brakes can be locked for parking.

During ground taxi with the engine in its minimum governing range, vibration is very heavy. There is never any divergent build-up, however, eliminating a helicopter nemesis, ground resonance, that can cause considerable structural damage within seconds.

With Kaman's chief test pilot, Al Newton, aboard for this phase of the three-hour flight evaluation, takeoff was initiated into a north wind at five mph on a cloudy 53-degree day at 12:03 pm.

Grossing out at 5,650 pounds, some 250 pounds below basic mission gross weight, lifting into a hover required only 90 per cent of power while the rotor was still in its minimum governing range. A three-position engine speed governor or "beepee" switch is located on each collective pitch lever switch box. Spring-loaded to the *off* position that lies between Increase (*inc*) and Decrease (*dec*) switch adjustment regulates power turbine governor speed settings. Once the rpm per cent is set, the automatic fuel control on the governor meets the demand to maintain it.

The intermeshing rotor design lends itself to the use of longer blades than a comparable-sized helicopter can normally afford. In providing this larger lifting area for a smaller relative weight, the H-43B is capable of greater lifting for its horsepower, and can apply all of its power for lift with none necessary to drive a tail rotor.

Full control is administered to the blades through conventional helicopter controls, collective pitch lever, cyclic stick and directional pedals. However, unlike conventional helicopters the controls do not work to move the rotor system directly. Lightweight mechanical linkages of the push-pull rod type act on the small servo-flaps at the outboard trailing edge of each rotor blade much as the ailerons of an airplane control the angle of attack of the wings.

The collective pitch lever also activates the trim tab on the floating tail.

Performance—Climb-out at 83 per cent (30 PSI) of available torque at 50 knots indicated air speed (IAS), gave us a 2,000 fpm rate of climb. Later in the evaluation, using 100 per cent of available torque (37 PSI), a vertical 2,000 fpm ascent was made at zero airspeed.

Cruising at 75 knots afforded the best performance characteristics for the 43B outside of the slow-flight range. Although there seems to be a constant two-per-revolution beat throughout the aircraft, the controls at this speed react similar to those in multi-engine fixed-wing equipment. With no force gradient tied to the directional control pedals there is no torque differential in the rotors in straight flight.

At 80 knots the directional stability system, which detects yaw, slip, and turn movements, and compensates for them by positioning the rudders, disengages automatically, moving them to neutral and locking them through a hydraulic rudder lock.

Speeds in excess of 80 knots were marked with increasing stability loss on all three axes. Going through 100 knots up to the 105-knot red line, stability deterioration ac-

(Continued on page 67)

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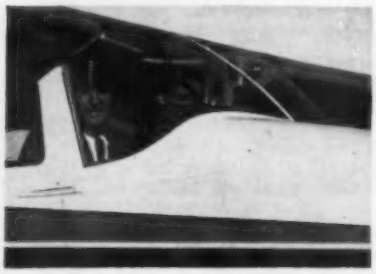

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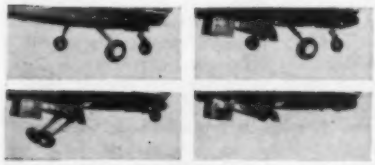

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CESSNA

12 BUSINESS AIRCRAFT

(Continued from page 64)

celerated considerably, but at no time was there a loss in controllability.

In efforts to encounter blade stall in the 43B, none could be induced even in the high-speed range.

During the flight some roughness in the form of vertical vibration was encountered, indicating that one of the blades was not in proper alignment. This was checked visually by observing the tip-path-plane of the blades. The right blade showed itself to be out of track and was corrected, in flight, by beeping the right toggle of two switches (one for each blade) set above the pilot's forward window.

In turning the H-43B, quite a bit of directional control pressure is required, and the reaction to it is quite a bit slower than that found in tail rotor helicopters.

When the pedal is depressed, the pitch of the corresponding rotor is decreased while the opposite rotor increases, creating a lift differential in the blades which initiates the roll to the desired heading.

To facilitate cyclic displacement, a trim release button on the cyclic stick grip, when depressed, allows free movement of the cyclic by negating all forces imposed on it. When the desired stick position has been established and the button is released, the cyclic maintains its new position.

More effective, however, for relevering control pressures is the cyclic trim switch located on the console. Spring-loaded to the center—*off*—position the switch is labeled *forward, aft, left,* and *right.* Proper manipulation of the electrically activated device neutralizes the forces imposed by the desired attitude while the stick is still free to move its full range.

In changing power for climbs and descents, the governor eliminates the necessity for the twist grip throttle to be rotated away from its full open position. Lowering the collective creates a tendency of the nose of the 43B to dump over. This is compensated for, to some extent, by the collective movement also acting on the trim tab of the tail elevator to hold the nose up. However, displacement of the cyclic aft is a necessary part of any blade pitch reduction. The converse is true when adding collective.

Emergencies—In the event of governor failure—simulated during the evaluation—the fuel control switch is taken out of the Automatic (*auto*) position and placed in Emergency (*emer*) to allow the fuel to bypass the governor and be metered manually through throttle manipulation. Flying the 43B in this way caused no difficulty, but the throttle corrections should be made gently. It handles much like those found in very sensitive piston-engine helicopters.

Shutting down the engine at 600 feet to simulate engine failure allowed ample time to attempt a restart while going through normal auto-rotative procedure. The collective pitch lever was lowered to the full down position and the throttle retarded to its ground idle or starting position, and the starter button was depressed. The re-start was fully accomplished at 200 feet.

Sudden engine failure produces no yawing effect in the twin-rotored craft. Failure on takeoff and in a hover were simulated during the evaluation. In neither instance is the collective to be lowered from its up position, using all the collective available at ground contact while maintaining a level attitude.

At 10 feet the collective can be decreased slightly to gain greater cushioning effect at touchdown by utilizing the additional blade inertia afforded when collective is again brought in.

The short tail booms provide room to add a gentle flare to dissipate ground speed, but the cyclic must quickly be displaced forward to attain the level attitude at touchdown. Variations of this technique are dependent on gross weight, temperature, terrain, and wind up to 450 feet.

Autorotations from above this altitude were accomplished as easily as a normal power-on landing.

With the collective full down at 700 feet a turn was initiated into the wind for best flame-out performance (down-wind autorotations were also a part of the evaluation). Maintaining an indicated airspeed of 55 knots gave the 43B a 1,300-fpm rate of descent. At 100 feet a partial flare dissipated airspeed to 40 knots. Accentuating the flare and leveling the aircraft while applying collective touched the Huskie down gently with approximately five knots of forward roll.

KAMAN H-43B

Specifications:	
Maximum gross weight	5,900 lbs.
Empty weight (std. equip.)	4,469 lbs.
Fuel capacity	1,300 lbs.
Normal payload with full internal fuel	2,800 lbs.
Rotor diameter	46 ft. 10 in.
Number of blades	2
Height to top of rotor pylons (overall height)	12 ft. 7 in.
Fuselage length	25 ft. 2 in.
Fuselage width	8 ft. 4 in.
Fuselage length (rotors operating)	47 ft.
Fuselage width (rotors operating)	51 ft. 6 in.
Engine	Lycoming T53-L-1 Gas Turbine
Rating (takeoff)	860 shp
Rating (max. continuous)	770 shp
Engine dry weight	460 lbs.
Performance:	
Maximum speed @ S.L.	104 kts.
Maximum diving speed	130 kts.
Normal cruising speed	95 kts.
Maximum rate of climb @ S.L.	2,000 fpm
Vertical rate of climb @ S.L.	1,530 fpm
Service ceiling	25,000 ft.
Hovering ceiling (in ground effect)	21,000 ft.
Hovering ceiling (out of ground effect)	18,000 ft.
Range	205 nautical mi.
Best range cruise speed	85 knots
Endurance	3.2 hrs.

Maintenance—The H-43B is provided with easy and immediate access to all components of a periodic maintenance or inspection nature.

The engine is light in weight (460 pounds dry weight) and in its exposed position is readily accessible. It has been removed in less than 15 minutes.

The Air Force's H-43B has much to recommend it in engineering, performance and maintainability. Its accomplishments in crash rescue should be studied and applied by those seeking more effective safety methods for commercial aviation. END

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Qantas

(Continued from page 33)

flight as "routine" and it received only passing attention in Australia, and practically none at all in the rest of the world.

The dream began in 1919 when the Australian government offered £10,000 to the first Australians to fly from England to Australia in 30 days or less in an English airplane. Fysh and McGinness, both recently out of the Australian Flying Corps, the latter with nine enemy planes to his credit, decided to enter the competition, but their prospective financial angel died and they decided, instead, to accept a government job surveying the route over which the contestants would fly.

With a Model-T Ford loaded with gasoline drums and camping gear, the pair set off across the desolate, trackless and seemingly endless outback of Northern Queensland, sparsely populated by adventurous cattle herders and sheepmen and wild aborigines. Along the way, they staked out landing fields for the contest flight, setting up gasoline and oil dumps as they went. Finally, they reached the settlement of Burketown on the remote Gulf of Carpenteria, and then Darwin, where Fysh settled down to await the contest flight and McGinness returned to Cloncurry.

As it turned out, Hudson Fysh did not have long to wait. Brothers Ross and Keith Smith, with a pair of mechanics named Bennett and Shiers, set out from England on November 12, 1919 and landed in Darwin on December 10. Fysh checked the engine seals affixed in London on the Vickers Vimy and certified them as the contest winners.

Meanwhile, down in Cloncurry, McGinness was about to set out on a Sunday picnic with his girl friend when he met a local resident whose car had broken down outside of town. McGinness turned his girl friend over to another escort, and, with cattleman Fergus McMaster, rounded up parts and tools and returned to the bed of the Cloncurry river to fix the broken axle.

A few weeks later, McGinness and Fysh met McMaster in a Brisbane hotel and described their long-standing idea of forming an airline to make charter flights and take passengers up for joy rides in Western Queensland.

McMaster, a veteran of the Australian Imperial Forces, was ready to be sold. He agreed to put up cash, and since he had a free afternoon he paid a few calls around town. He returned to his hotel with enough cash and pledges to start the airline.

Fysh and McGinness rushed to Sydney and ordered two Avro 504K biplanes. The order on August 19, 1920, was made out to the Western Queensland Auto Aerial Service, Limited, but by the time the papers of incorporation were signed, the new company officially was called the Queensland and Northern Territories Aerial Services.

During the next two years before Kennedy's historic flight, the new air service survived a variety of perils.

A few months after incorporation, the company came very close to losing three of its four partners and its only two airplanes.

(Continued on page 71)

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(Continued from page 68)

McGinness took off from Longreach for the town of Winton in an Avro 504K, with McMaster and Stockholder Ainslie N. Templeton as passengers, followed by Fysh in a British BE2E, with a Longreach stock agent named Knight.

McGinness took the wrong heading and then stubbornly stuck by his compass despite the protests of McMaster and Templeton, who vainly passed him scribbled notes and pointed to a wind-whipped map. Fysh did not help matters by passing the Avro and continuing on the same course.

Finally, all become convinced they were lost. McGinness took a new heading. The Avro engine burped noisily as the main tank went dry and McGinness switched on the emergency tank.

Two hours later, a tiny cluster of buildings was seen far ahead. It was Winton. Both planes landed with virtually dry tanks.

McMaster and Templeton climbed out and shook hands. "Thank God, or the pilot," said McMaster.

"Let's thank both and make sure," replied Templeton fervently.

Today, 41 years later as chairman of the vast QANTAS Empire Airways network and president of the International Air Transport Organization, Sir W. Hudson Fysh at 66 can look back with wry amusement at those perilous early days and recall with a chuckle the Longreach matron who inspected the new-fangled flying machine, was fascinated by its gadgets. She spied the propeller and exclaimed brightly, "Oh, I say, do look! How lovely! They even have a fan for the pilot."

Today, Sir Hudson is almost the sole survivor of the era and, significantly, a notable figure in world aviation. McGinness, Baird and McMaster have passed away, leaving behind Sir Hudson's and QANTAS' often incredible saga of flying.

Kennedy's memorable ride was followed by a series of ups and downs experienced by many another airline in its infancy. A high point was reached when one of the early women passengers offered a flowing testimonial: "I had my morning tea while speeding along at a height of 5,000 feet."

However, it would have been pretty cold tea had it not been for a thermos jug. Cabins were open and windy. In the winter pilots and passengers were chilled despite leather coats, fur caps and goggles. In the summer they roasted.

Through it all, Fysh and McGinness flew day in and day out in iron man fashion, until the company built a DH-50 in its shops under license from deHavilland and offered its customers a cabin-enclosed ride.

The company books for 1924 showed: 35 route passengers carried, 11 taxi passengers, 616 pounds of freight, 1,050 pounds of passenger luggage, and 9,778 miles flown. (Today, QANTAS' 707s and piston-engine planes average 1,300,000 miles per month.)

By 1926, net profits were £3,848 and 13,042 miles were logged.

The following year, QANTAS established flying schools at Longreach and Brisbane, increased the company fleet to six planes.

Up to this point, safe passenger trans-

(Continued on page 72)

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(Continued from page 71)

portation had been the sole concern of the airline, but in 1928 Qantas inaugurated a humanitarian service that still is a major program in rural Australia.

One of the principal handicaps to living in the limitless outback was always the lack of communication with civilization. Cattle and sheep stations were hundreds of miles apart. Illness and accident were ever-present dangers.

In 1928 the famed "Flying Doctor Service" was organized at Cloncurry by the Australian Inland Mission, using DH50s and QANTAS pilots. Now it was possible to fly to the aid of the stricken in remote areas and return them to hospitals in a few hours. Today, the Flying Doctor Service has become an integral part of rural Australian life.

Progress went hand in hand with humanity. By 1930, QANTAS had logged a million miles. Headquarters were moved to Brisbane. Fysh continued to serve as chief pilot and managing director.

Like many another air pioneer of this era, he was looking for new skies to conquer. In 1931, he flew as pilot of the first England-Australia airmail service. Later, he made a survey flight to India and toured Europe studying the development of commercial aviation there.

By 1934, the bush airline was ready to move out and up. It merged with British Imperial Airways—still an alphabetical oddity called Q.A.N.T.A.S.—but now an international airline flying the Australian-London air mail service.

In 1939, with war clouds on the horizon, the Royal Australian Air Force took over two QANTAS flying boats to form the nucleus of a squadron. By 1941, QANTAS and Fysh were in World War II in earnest. Five of their 19 Catalina flying boats went to the RAAF. Planes were diverted to take part in the famed Buna-Goona "bully beef bombings" in New Guinea. A Townsville-Port Morisby airlift was organized that carried 12,744 passengers on 564 flights.

WITH the war on in earnest, QEA flying boats carried 24,167 frontline troops and equipment into the New Guinea battle zones and evacuated casualties on the return trips.

By the end of the war, Fysh was a legend in commercial aviation and QANTAS was a name to be reckoned with on world air routes. In 1947, the Australian government purchased the airline and pioneered the South Pacific route with Lockheed Constellations. With Fysh at the helm, service was expanded to Europe, Japan, the Pacific Islands and South Africa. Sydney became the headquarters.

In 1953, Fysh was knighted. He remained as managing director of the firm he helped to found 33 years earlier, becoming chairman of the board in 1955. He still directs company policy but in later years has taken an increasing interest in world aviation problems, serving first on the executive committee of the International Air Transport Assn. and now as president.

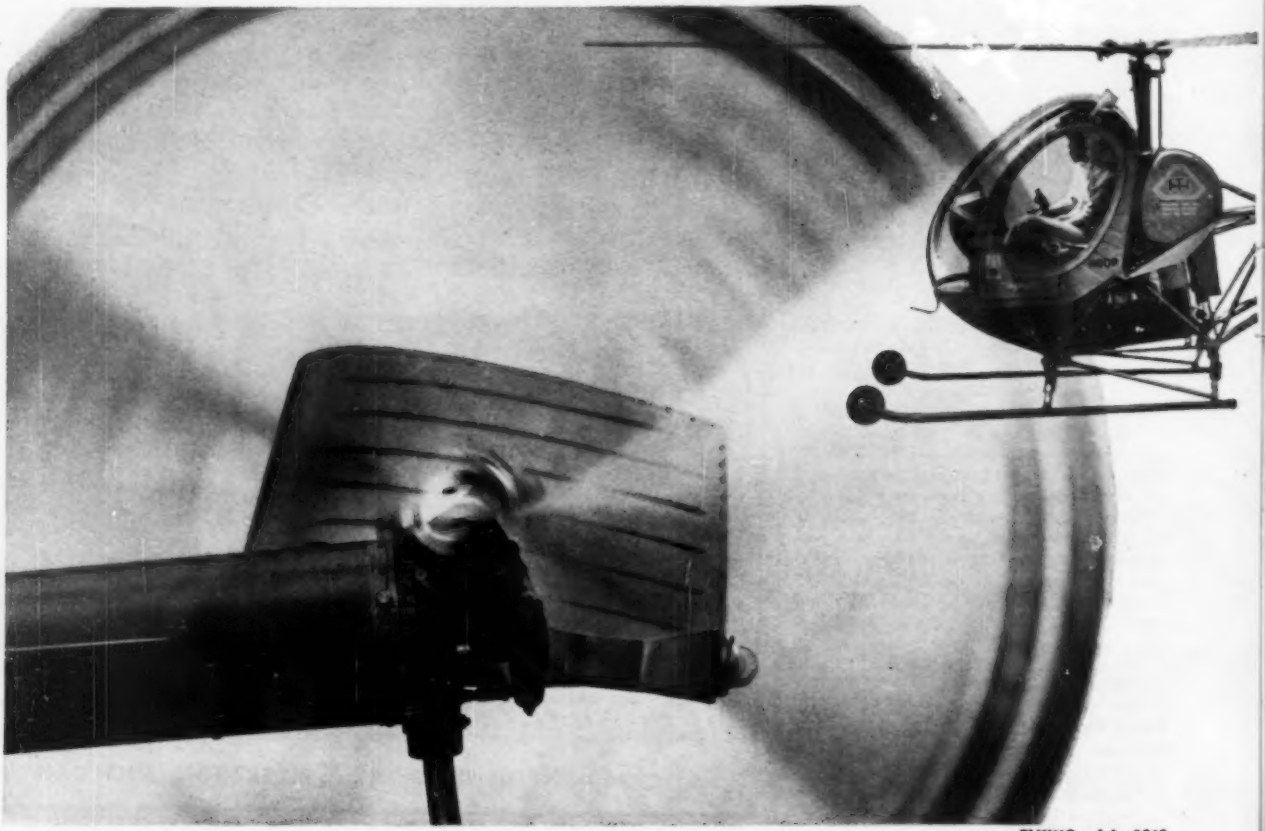
In a speech made not long ago in Sydney on the occasion of the QANTAS inaugural Boeing 707 jet service, which became an around-the-world route later, Sir Hudson reminisced briefly on his coming of age with aviation.

"The first new airplane we took over was the Avro Triplane in 1922—37 years ago," he remembered. "I ran second in it in the Sydney Aerial Derby. I then condemned it. It cost us 4,250 pounds and we had at the time 6,750 pounds' capital. Since then we have taken delivery on one new type of airplane for every 15 months of our 38 years of operation.

"Our first airplanes in 1921 did 70 miles per hour, and the passengers had to wear goggles and caps. This was in the days when north of Charleville, flying into a 40 mph headwind, I had the lowering experience of being passed by a motor car."

After explaining the principles of jet flight and aero-dynamics to his Rotary Club audience, the man who had helped aviation grow from its infancy said, "Why be an oyster which can't have much fun? Why not emulate the swifts and migratory birds and follow the seasons. Given peace, the progress of air transportation will be such during the next quarter of a century as will see a great annual intermingling of the peoples of the world through travel and tourism.

"The industry must look to economies to produce the peoples' international airplane. I am confident that it will be done. It is necessary for the fulfillment of air transport destiny in bringing the peoples of the world closer together." END



What Airmen Want

(Continued from page 29)

plans and services.

Weather—Pilot reports should be mandatory. Airlines should cooperate as in Canada. Low-frequency continuous broadcast needed. High-frequency needed because low-frequency can't be heard through static in bad weather when most wanted. Sequences should include winds aloft. Courses by meteorologists should be available so pilots can make weather estimates.

IFR—For sale ads show many aircraft with instruments the average pilot can't use. Pilots should proceed to instrument rating. VFR pilots should be allowed to fly IFR in clear weather for practice; should be allowed to ascend or descend through overcast but not make airport approaches. Simplify IFR procedures under VFR conditions so pilot is not too occupied to keep watch for lightplane traffic.

VFR—Clearance through high-density zones needed. Fines should be stiff for flying below weather minima.

Traffic—Resume "near miss" reporting without fear of pilot being penalized. Radial system around airports for different speeds with altitude separation.

Airman Lists—A pilot who got four copies of the Halaby letter noted this as inefficient. (Mr. Halaby wants lists of FAA "customers" improved.)

Ground Schools—Want more of them; appoint a FAA safety officer in each area to develop.

Airman Exams—Avoid trick questions. "A small group of bureaucrats sneeringly say, 'Let's see if the boobs can penetrate our thinking.'" Give "personality" exams to pilots to judge their fitness.

Flight Training—Changes in flight maneuvers are burdensome to schools.

Students—FAA is antagonistic to amateurs; should have special office to help them. Student pilots should be so identified in calling towers.

Aircraft—Work toward "spherical visibility" so pilots can see all around. Make it easier for home-built planes to be certificated. Give plane owners more freedom to do their own maintenance.

Rotocraft—Give autogiro rating without fixed-wing rating. Let local FAA men approve helicopter operations anywhere that property owners permit.

Medical—Most complaints were because family physicians no longer can check pilots without becoming medical examiners and the fees aren't worth the trouble. (After attending one of FAA's medical seminars, the writer has gained respect for aero medicine as a science that should be studied before it is practiced.)

WE could go on turning the kaleidoscope of pilot ideas. But let's give the flight operators their say.

Several weeks after the letter to pilots in early March, Mr. Halaby wrote some 5,000 fixed-base operators. He made five points:

1. Urge pilots to take proficiency training.
2. Insist on more skill for buyers of high-performance aircraft.
3. Help customers set realistic weather standards.
4. Make it easy for customers to do what is safe.
5. Help transients understand field rules and local conditions.

Initial responses are favorable. Also, much operator comment has been heard in FAA's series of regional conferences with pilots and plane owners.

These Air-Share meetings were developed by the FAA Bureau of Flight-Standards to get practical ideas on how to solve safety problems that may require regulations. "Air your views; share the benefits."

Six meetings were held with good results; one in each of FAA's four domestic regions, Alaska, and Hawaii. Mid-week dates were chosen so operators, busy on week-ends, could attend.

FAA people forecast the doubling of general aviation hours in 15 years (1960 to 1975) and made it clear that FAA will have a much bigger work load in this field.

Opinions were fairly consistent, with some regional variations, on eight Flight Standards agenda items.

1. *Written Exams*—To prevent cribbing in written airman tests, prerequisites for taking exams were agreed in the west but drew some midwestern opposition.

2. *Instruments*—Pilots should not get instrument ratings by check-out on old low-frequency ranges without modern VOR also, according to mountain ideas. Flatland people thought a rating could be limited to

(Continued on page 74)

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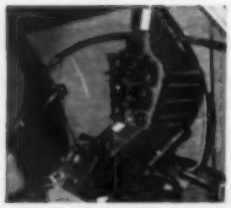

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(Continued from page 73)

the facilities the pilot knows.

3. *Students; Instructors*—More dual time for students; more instructor control. More check-out by designees but instructor not to check own students. FAA men want periodical re-qualifying of instructors.

4. *Airman Certificates*—Periodic renewal, other than by medical exam, was thought unnecessary. If done, should be simple mail system.

5. *Type Ratings*—On whether all pilots should be required, as airline pilots are, to demonstrate instrument capability in tests for heavy aircraft, it was doubted there is enough experience to judge. Likewise on type ratings for small turboprops though maybe for small turbojets.

6. *IFR Takeoff*—Minima of 200 feet and a half-mile visibility for IFR takeoff were favored for all pilots, rather than just airlines, in west, not in midwest or east.

7. *Limited Private*—Because it takes time and money to meet Private Pilot requirements, including instruments attitude training, a limited ticket for flying around airports was suggested but was disfavored.

8. *Aircraft Ratings*—A breakdown of the rotocraft into subheads was favored, since helicopters and gyroplanes differ.

These regulatory proposals have long been pending with industry interest, not merely inside FAA.

Mr. Halaby wants to avoid regulations except for problems that can't be solved by other means—education, devices, and flight aids. The Air-Share meetings were broadened beyond the original agenda by putting as much time as possible into open discussion.

Some weekend fly-in meetings are planned to get more amateur pilots to advise.

Action probably will not be immediate on any broad front. It takes time to draft regulations and adjust programs, spread through the FAA bureaus, offices, and regions. But pilots now have been heard.

Perhaps most important, the pilots know what they want, as never before. With patience and teamwork, since the door is now open for cooperation with FAA, they can get whatever they can prove makes sense. And this is something new. END

Piper Cherokee

(Continued from page 35)

plane was flown solo, with 10 gallons of 91/96 octane fuel in each 25-gallon wing tank. Weighing 700 pounds less than its 2,200-pound maximum gross weight, the Cherokee would be expected to out-perform company figures from takeoff to touchdown, and it did. On a standard no-flap takeoff from Lock Haven, elevation 550 feet into a 10-mph headwind on a 60-degree F day, the wheels left the 3,300-foot paved runway after approximately 700 feet of roll. Holding the recommended 85-mph climb speed and takeoff power of 2,700 rpm (rated rpm for the 160-hp Lycoming), the Cherokee climbed at 1,200 fpm, just 450 fpm faster than Piper's maximum gross weight performance figures. This put the airplane over the end of the runway at 800 feet. The angle of climb at 85 mph was quite steep.

At full power and 85 mph, the Cherokee climbed through 4,000 feet indicating 850 fpm; at 5,000 feet it was down to 800 fpm. Eight minutes and 15 seconds later the airplane passed through 10,000 feet still holding stubbornly to 85 mph IAS and indicating 400 fpm in the climb. Company specifications indicate a service ceiling of 15,000 feet and an absolute ceiling of 17,500 feet.

Holding straight and level at 10,000 feet, the outside air temperature gauge stabilized to 26 degrees F.

At a low cruise of 2,200 rpm and 13 inches mp, the Cherokee indicated 78 mph for a true airspeed of 90 mph. For a faster cruise, 2,400 rpm and 17 inches mp was used, which resulted in 99 mph IAS and 114 mph TAS.

Descent to 5,000 feet gave an opportunity to sample the Cherokee's high-speed flight. It took a good deal of nose-down trim to keep the airplane in a dive, until at 170 mph the trim indicator was nearing the limit of its travel. Controls at redline airspeed were stiffer than normal, which is to be expected, and just a little control movement gave a rapid and definite response.

At 5,000 feet the airplane settled back to low cruise at 16 inches mp and 2,200 rpm. Airspeed stabilized at an indicated 97 mph, which worked out to 106 mph TAS. Normal cruise of 2,500 rpm and 19 inches mp gave 114 on the dial, 121 mph TAS. Pushing ahead to takeoff power, 2,700 rpm and 22 inches mp swung the airspeed needle up to 125 mph, or 133 mph TAS.

In-flight visibility is very good, and is one of the airplane's best features. The Cherokee has a large windshield and oversize windows; the roof cornerposts are narrow. This adds up to comfortable visibility in cruise, and you can see back to the outer ten inches of the stabilator.

The airplane was stalled at 5,000 feet. With carburetor heat on and power off, the Cherokee held altitude until the airspeed reached 56 mph. The Cherokee stall is not quite so gentle as the Tri-Pacer stall, but still it lacks the sharp break of earlier airplanes. The elevator control column is designed so that the last few inches of travel impart an upward movement to the control wheel, a reminder that you have just run out of elevator. With the wheel all the way back, the Cherokee stays in its stalled condition, its nose gently porpoising as you descend at about 800 fpm. Use of full power as the airplane stalls results in quick recovery without noticeable loss of altitude.

Flaps down their full 40 degrees, the Cherokee repeats its stall character. At the light gross weight of the evaluation airplane, the full-flap stall came at 46 mph IAS. Rudder is quite ample for directional control. In slow flight, full flaps and 2,100 rpm turtled the airplane along at 48 mph.

Procedures in the landing pattern with the Cherokee are standard. Downwind leg was flown at 100 mph, base leg at 90. Flaps were levered down as the airplane rolled out on final approach. The nose of the Cherokee dropped as though it were mechanically connected to the flap lever, and little additional trim was necessary to hold an 85-mph final approach speed.

The fence swept by beneath the wheels,

(Continued on page 76)

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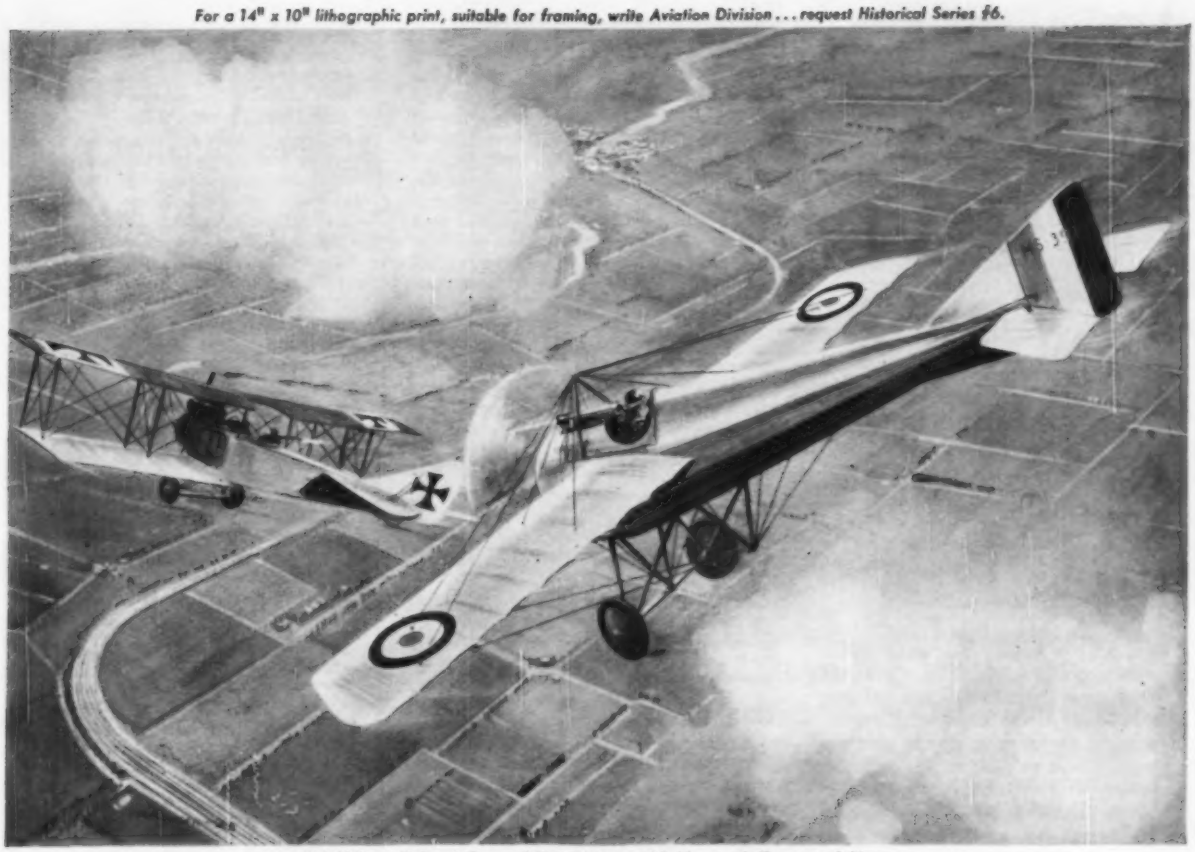

April, 1915 . . . Roland Garros' first victory with his specially armed Morane.

Early War Birds— THE MORANE N, "BULLET"

This French monoplane was used early in World War I for reconnaissance, light bombing, and as a "fighter." Uniquely streamlined for its time, it employed wing warping for lateral control and was powered by an 80-horsepower Le Rhône rotary engine to a top speed of nearly 100 mph. Endurance was 1¼ hours. The "Bullet" is perhaps best remembered in connection with Roland Garros and his unsynchronized machine gun firing through the propeller arc. The propeller was fitted with steel deflector plates near the hub to protect it from those bullets which did not pass through. The arrangement had been tried earlier by another Frenchman, Eugene Gilbert, but abandoned. Garros perfected the deflector plates to the point where the device seemed worth trying.

On April 1, 1915, the chance came. Garros, on a solo mission to bomb a German railroad station, encountered an Albatros two-seater. He attacked, flying to cut off his adversary's retreat. The German observer fired back, but Garros' new "flying gun" proved more accurate. Maneuvering his little ship and sighting down the Hotchkiss gun in front of him, he sent the Albatros down in flames. After this initial victory, Garros' success continued. By April 18, he had gained 5 victories—on one occasion taking on four enemy planes single-handedly. He was cited for the "Légion d'Honneur" and widely acclaimed in the French press as an "Ace" . . . probably the first such use of this familiar term.

On the same day as his fifth victory, Garros was forced down behind enemy lines, and the Germans learned of his "secret weapon." Spurred on by Garros' success, both sides soon developed completely dependable devices for synchronizing gun firing with propeller rotation . . . beginning a new era of aerial warfare and fighter aircraft. As for Garros, after more than two years of captivity, he escaped and returned to fight . . . only to be shot down and killed a month before the Armistice.

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(Continued from page 74)

a roundout was begun at what was judged a few feet above the runway, and the airplane obligingly rolled its wheels smoothly on the asphalt. This was somewhat of a surprise; there's a tendency to round out rather high when flying the first few landings in a low-wing airplane. In the Cherokee, though, the combination of good visibility and reasonably long landing gear accounts for touchdown when you expect it.

Going around on a touch-and-go, full throttle was added and the airplane was away from the ground in roughly 400 feet of roll. It fit quickly into its steep 85-mph climbing attitude and was indicating 900 feet over the end of the runway.

On the next approach, the 900-foot pattern altitude was held until roll-out on final approach with the runway almost under the nose. At low airspeed, full flaps and power off, the airplane touched on the first third of the runway. With moderate braking, it was ready to turn off at the center taxiway, after a roll of approximately 700 feet. It will not be a simple matter to overshoot runways in the Cherokee.

Unlatching the big door during taxi gives a great flood of air through the cabin, a welcome feature for hot-weather operation.

The airplane also was flown with tanks filled to their 50-gallon capacity, three occupants and light baggage. Figures show that four 175-pound passengers, a full 100-pound load of baggage, and 50 gallons of fuel would put the Cherokee 95 pounds over its 2,200-pound maximum gross weight. Piper classifies all fuel over 36 gallons as reserve fuel, to be used for extra range when load conditions permit.

With full fuel aboard, the Cherokee has a maximum range of 900 miles. For the evaluation, the aircraft was flown on a 100-mile cross-country. When the door was latched for takeoff, the airplane's weight was just 2,000 pounds.

With the heavier load, the airplane was airborne in about 800 feet, indicating 800 fpm at 105 mph, which gave a much more comfortable angle of climb than the recommended 85-mph figure.

As we passed through 2,500 feet, a 90-mph climb gave us just under 1,000 fpm; the cold air at altitude helped us this time to exceed company figures. At 3,500 feet we experimented with the stall speeds.

Flaps up and power off, the stall-warning light flickered on at 75 mph, and the airspeed needle bounced at 67 mph IAS when the stall came, a little more positively now than during the light-gross-weight stalls. Flaps down, the indicated airspeed was right on the company's 56 mph when we stalled.

A pilot with previous Cherokee time took the controls for a moment and made an interesting demonstration. "Say a fellow's in the traffic pattern," he said as he pulled the carburetor heat out and the throttle back, "just turning to final approach . . ." With the airspeed falling through 70 mph, he began a turn to the left. "He sees that he is a little low, so he holds the nose up . . ." The stall warning light was on. "He sees that he's overshooting the final turn, so he steepens the bank . . ."

The Cherokee was banked a little over 30 degrees, the stall warning light was bright on the panel, and the airspeed passed down through 60 mph. I tightened my seat belt and silently reviewed my spin-recovery techniques.

"He's not really in much trouble . . ." At 55 mph, with a little shudder, the nose gently lowered itself as the airplane stalled. It may be possible to spin the airplane, but it would require quite a bit of effort.

On this short cross-country, I was glad for the padded plastic headliner. We encountered moderate to severe turbulence, and I made one rather forcible contact with the ceiling before I really became serious about tightening my seat belt.

The instruments were occasionally difficult to read, for the Cherokee, despite her other qualities, is not immune to rough air. Even in the turbulence, the airplane showed that it is a little quieter than most light aircraft at cruise power—conversation at normal level was possible, but we spoke somewhat louder to make it easy.

The air smoothed out for a moment, and the airspeed needle steadied at 128 mph at 2,600 rpm and 23 inches mp. That worked out to 134 mph TAS, four mph below the company's top speed figure (calculated for an optimum altitude of 7,000 feet).

The one most impressive feature of the Cherokee is its honesty. You feel right away that you can take it anywhere safely; I felt at home more quickly in the Cherokee than in any airplane I've yet flown. That's a good feeling at any price. END

PIPER CHEROKEE

Specifications:

Engine	Lycoming 0-320-B2B
Gross weight	2,200 lbs.
Empty weight	1,195 lbs.
Useful load	1,005 lbs.
Wing span	30 ft.
Wing area	160 sq. ft.
Length	23.3 ft.
Height	7.3 ft.
Propeller diameter	74 in.
Power loading	13.8 lb./sq. ft.
Wing loading	13.8 lb./sq. ft.
Baggage capacity	100 lbs.
Fuel capacity	36 gals.
Fuel capacity with reserve (full tanks)	50 gals.
Wheel base	6.2 ft.
Wheel tread	10 ft.

Performance (at gross weight):

Top speed	138 mph
Cruising speed (75% power, sea level)	123 mph
Optimum cruising speed (75% power, 7,000 ft.)	132 mph
Stalling speed	56 mph
Takeoff roll	775 ft.
Landing roll	550 ft.
Best rate of climb speed	85 mph
Rate of climb	700 fpm
Service ceiling	15,000 ft.
Absolute ceiling	17,500 ft.
Fuel consumption (75% power)	9 gph
Cruising range (75% power, 7,000 ft., std. fuel)	4 hrs., 528 mi.
Optimum cruising Range (60% power, 10,000 ft., std. fuel, 7.2 gph)	5 hrs., 570 mi.
Cruising range (75% power, 7,000 ft, reserve fuel)	5.5 hrs., 725 mi.
Optimum cruising range (60% power, 10,000 ft., reserve fuel 7.2 gph)	7 hrs., 800 mi.

RELIABILITY

The way some pilots talk about their experiences with aircraft radio, you'd almost think there were people in the business trying to make things NOT work. Of course that's not true. We all know the industry is sincerely dedicated to reliability.

The ultimate reliability of any radio system, however, depends on many people and many factors. A perfect radio can malfunction if improperly installed; a good installation can look bad if the radio's out of kilter; and good radios, properly installed, can go sour if abused.

The manufacturer, on his part, is thoroughly conscious that his future depends on good public acceptance. This means quality design and manufacture with an amazingly high percentage of production staff devoted to inspection, test, quality control and surveillance. Then, recognizing that even the finest equipment, after shake-down, may need adjustment, a reputable manufacturer backs up factory quality control with field warranty service.

Next comes the installer, who is really the key to satisfactory performance of the electronic equipment you buy. You should choose him wisely, not just because he offers you the best deal. The conscientious installer realizes that electronic equipment, bounced and jolted in shipment, can lose some of the peak performance it had when it left the factory. To save you and him future headaches, he will check and test the equipment before he installs it, making necessary adjustment at this stage. The good installer, also, makes sure you, the new owner, understand how to get best operation from the equipment.

Subsequent continued good operation of electronic equipment depends on a certain amount of team work between you and your electronic service shop. This involves, primarily, an understanding on your part about the need for simple electronic maintenance procedures. Just as batteries must be filled, filters cleaned, light bulbs replaced, engine oil changed, so must navigation circuits in your radio be compensated, vacuum tubes replaced and other components checked. There are many symptoms which tell you when things should be looked at—decreased volume, inaccurate navigation signals, increased hash, to name a few.

Finally, a few things to consider about abusing aircraft radio. Are you sure your equipment's turned off when starting the engine? Is your installation ventilated sufficiently to avoid overheating? Do you try to run all your radios during a long wait at idle RPM on the ground?

Summing up, electronic reliability is not at all elusive. Good equipment properly installed, given the same maintenance you give your engine and used in a sensible manner, will give you very faithful service.

Regards,

Nancy

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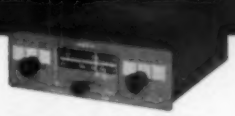

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Engine Maintenance

(Continued from page 47)

only and operated at 50 to 60 per cent of rated power, except for short periods of full throttle operation during takeoff, the engine will usually equal or exceed the recommended time between overhauls.

On the other hand if the airplane has been used for student training, or flown by a pilot who abuses the engine by absurd throttle manipulation or running at 80 to 90 per cent of rated power for prolonged periods of time, it may be necessary then to top or major the engine much sooner than the manufacturer suggests.

Other factors which contribute to reduced life of an engine are poor cowling or baffling maintenance, operating above rated power, irregular oil changes, improper carburetor maintenance, sub-standard ignition performance, incorrect size and pitch of propeller, and improper octane rating or too great a lead content in fuel.

Experience has indicated that one of the best methods for trouble-shooting engine ailments is to decide on the various possible causes of a given trouble and then eliminate them one by one, beginning with the most probable or easiest to check. A general plan toward this goal can be as follows:

Failure of engine to idle properly.

1. Incorrect carburetor idle adjustment.
2. Leak in the induction system. Since a leak here usually does not give any physical sign, it is best to check and tighten all connections in the system.
3. Low cylinder compression. Determine compression with a gauge or by "popping" a thumb.
4. Faulty ignition system. Check wires, connections, plugs and mag points.

Low power and uneven running.

1. Too rich a mixture indicated by sluggish engine operation, red exhaust flame at night. Extreme cases will manifest themselves by black smoke from the exhaust. To correct this, the carburetor should be adjusted by an authorized person; check the primer shut off valve for leakage.
2. Too lean a mixture indicated by over heating or back-firing.
3. Leaks in the manifold system.
4. Defective spark plugs.
5. Magneto breaker points not working properly.
6. Improper ignition timing.
7. Valve stem sticking in guide; incorrect valve clearance or timing.

Failure of engine to develop full power

1. Throttle lever out of adjustment.
2. Restriction in carburetor air scoop. Examine the scoop for loose papers, rags or any other foreign matter.
3. Improper fuel.
4. Valve faces or seats pitted and not sealing if blow-by is heard through the crankcase; worn or stuck piston rings also produce this symptom accompanied with excessive oil consumption. In either case this would call for a top overhaul, and, depending upon total time on the engine, perhaps a major overhaul.

(Continued on page 80)

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(Continued from page 78)

Rough engine.
1. Cracked engine mount.
2. Unbalanced or out-of-track propeller.
3. Defective mounting bushings.
4. If rough operation is accompanied by a loud noise, it indicates a broken piston. The cylinder will have to be replaced if it is scarred.

Loss of power on one magneto.
1. Spark plug failure.

Engine stops when run on one magneto.
1. Magneto failure.

Low oil pressure.
1. Insufficient oil.
2. Leak in the suction line or pressure line. Check the gasket between the accessory housing and crankcase; also check the gasket between the accessory housing and oil suction tube flange.
3. Dirty oil strainers.
4. Air lock or particles in relief valve.
5. Stoppage in oil pump intake passage. Check the line for obstruction; clean suction strainer.

High oil temperature.
1. Insufficient oil cooling. Examine air inlet and outlet for deformation or obstruction.
2. Insufficient oil supply.
3. Defective temperature gauge.
4. Low grade of oil. See manufacturer's recommendations for proper grade under various temperature conditions.
5. Clogged oil lines or strainers.
6. Excessive blow-by caused by worn or stuck piston rings. A top overhaul is definitely called for and possibly a major if there is considerable time on the engine.
7. Failing or failed bearings. Examine the engine sump for metal particles. If any are found, it is a good indication that a major overhaul is needed.

Excessive oil consumption.
1. Low grade of oil.
2. Worn or incorrectly installed piston rings.
3. Failing or failed bearings.

Perhaps after going through the list, it might appear that the modern lightplane engine is very susceptible to a number of ailments. This really is not the case, as the modern horizontally-opposed engines are dependable power plants with good performance records. Many pilots have enjoyed thousands of hours of safe flight behind lightplane engines, while only a relatively small number of pilots have experienced in-flight engine failure. END

Flexible Wing

(Continued from page 23)

and taking off on short, rough fields; but above all, the airplane must be cheap and simple if it is to be used by all units just as automotive equipment is now used.

Certainly any airplane which meets the Army's requirements for an aerial truck will have great appeal on the civil market. Enough test information is available to describe flexible-wing airplane designs and to make some predictions about their low cost, good slow-speed characteristics and general piloting ease.

The price of a new four-place flexible-wing aircraft could be in the $3,000 to $3,500 bracket—about half of the price of a conventional lightplane of the same passenger capacity. Cruise speed with a 90-hp engine could be 80 to 90 mph. Maximum gross weight of the airplane would be slightly more than 1,500 pounds compared to 2,100 pounds and over for the simplest four-place airplane now on the market. The flexible-wing airplane probably would land at a little better than 40 mph and it could land and take off over a 50-foot obstacle in less than 1,000 feet.

There are a large number of other attractive features about the flexible-wing airplane. However, even the most ardent supporter of this concept will not describe its virtues very long without pointing out that it isn't the answer to every desire of the private pilot. Flexible-wing airplanes are no different from any other in that they have definite limitations which accompany their advantages.

The majority of the small group of experts in this field apparently are convinced that these aircraft have a definite place in the general aviation picture, but most of them do not believe that they will replace solid-wing lightplanes to any great extent. They see flexible-wing airplanes bringing a new opportunity for inexpensive sport flying to thousands of people. The low cost and good handling qualities of these aircraft will make them excellent for relatively short-range flying at low speeds.

When it comes to efficient cruise above 100 mph the flexible wing will not be able to compete with current lightplanes and transports. Its short span prevents it from having the lifting efficiency of the long narrow wings on existing lightplanes, so flexible-wing aircraft probably would never be used over ranges of several hundred miles.

To the average private flyer the piloting characteristics of the flexible wing will be as unusual as the sight of the wing itself. Technically, their control systems are known as two-degree of freedom systems. This means the aircraft can climb and dive and make turns but it cannot hold a bank or roll over. In other words the flexible-wing aircraft has a control system just about like that of a blimp.

However, their maneuverability bears no resemblance to the lumbering motions of a blimp. Radio-controlled flexible-wing models tested at NASA and Ryan's flight test vehicle have shown that these aircraft are extremely maneuverable. They can turn quickly, perform tight figure eights and are generally very lively.

In its simplest form the control system will consist of four cables. One will be attached to the forward part of the wing, another to the rear and one to each side. The flight path is controlled by reeling the cables in and out so that the tilt of the wing is altered. Cable attachment points on the wing will be on the three poles which maintain its shape. Pivot point about which the wing tilts is just above the fuselage; it is the point of attachment between the truss work carrying the main wing loads and the primary structural members of the fuselage.

To make a right turn with the cable con-

(Continued on page 82)

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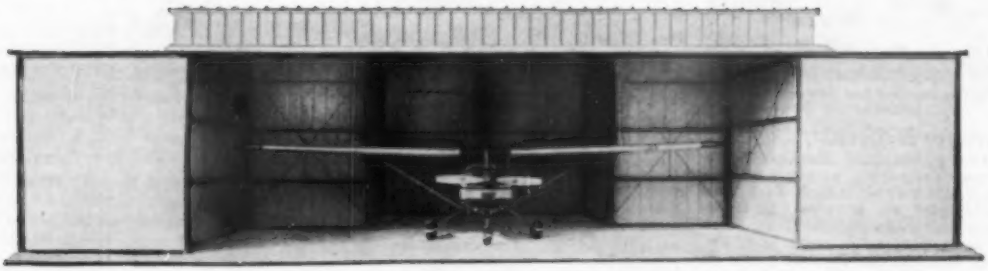

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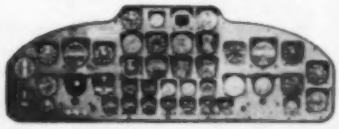

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(Continued from page 80)

trol system, the cable to the right side of the wing is reeled in while the one to the left side is let out. The wing and its lift force are canted to the right and the airplane is pulled into a right turn. A left turn is made in the opposite manner.

Climbing is accomplished by letting out the forward cable as the rear one is taken in, so that the wing's angle of attack is increased. Descent is handled in the reverse manner.

CLIMBING and diving turns are possible, but the fuselage will not tilt to steep angles. It will hang below the wing like a pendulum, which is one of the reasons for the fine stability of the airplane.

The two-degree of freedom control system will require that the pilot manipulate two levers or wheels. It is possible for the cockpit to be designed with two large wheels and the engine controls. One wheel would control pitch and the other yaw. No power boost for the controls would be needed on a four-place aircraft and probably would not be necessary on much larger aircraft. Large diameter pitch and yaw wheels attached to the drums on which the control cables are wrapped would provide enough mechanical advantage to keep the control pressures relatively light.

In order to trim the aircraft for best cruise attitude, a means would also be provided to shift the wing's pivot point fore and aft. The wing is not extremely sensitive to the center of gravity location so that a small motion of the pivot point would provide a rather long variation in allowable C.G. position.

One of the best features of the flexible wing, as far as treetop operations by the Army and civil pleasure flying are concerned, is its sluggish stall. The wing's angle of attack can be increased so that its keel pole makes more than a 30-degree angle with the horizontal. It will still mush along and slow the airplane down without stalling abruptly.

The best way to handle many of the details of flexible-wing design still have not been determined. The Army-Ryan flight test program will supply a number of the answers. One of the test objectives is to study the effect of the spreader bar which holds the poles in the wing apart. On some simple aircraft it may be possible to do without the pole. If good cruising performance is needed, a longer spreader bar might be used to increase the span and improve wing efficiency.

One of the most important effects to study is that of wing loading. Landing speed depends directly upon the weight of the airplane divided by its wing area (wing loading). A Piper Cub, for example, has a wing loading of about nine pounds per square foot, while the Cessna 310 is in the neighborhood of 27 pounds per square foot and the North American F-100 has a wing loading of about 90 pounds per square foot.

Wing loading on flexible-wing aircraft probably will be around five pounds per square foot. Landing speed with that wing loading will be about 40 mph or a little more. It is possible to get the wing loading and the landing speed down even more but this creates another problem.

Cross winds and gusts are a problem to aircraft with low wing loadings. When the wing loading goes down below five pounds per square foot, the airplane begins to act like a kite and becomes difficult to land on windy days. The Ryan tests will give a good indication of the optimum wing loadings for all classes of flexible-wing airplanes.

The flexible wing is attracting attention in a number of ways today other than in the lightplane field and for Army battlefield aircraft. Ryan is also studying the problem of using a flexible wing to recover the 60-ton Saturn booster developed by NASA. When the booster has exhausted its fuel and dropped away from the upper stages of the rocket vehicle, a flexible wing will keep it from being lost at sea. The flex-wing will pop out of a long slim container on the side of the booster as soon as its engines stop. It will enable the booster to make a slow and controlled descent back to a predetermined landing spot.

Payloads up to 120,000 pounds are being considered for flexible wings not only during the recovery of boosters, but for hauling large weapons and equipment bundles around a battlefield. These large vehicles will be able to use the same flexible construction material planned for lightplanes, ripstop parachute cloth. This cloth will be coated with mylar plastic to stop the leakage of air from the lower to the upper surface of the wing, for wing efficiency falls rapidly as leakage increases.

Several aircraft companies as well as NASA are studying flex-wing gliders made of woven metal cloth which could be used to bring large payloads back from space. This cloth is coated with a high-temperature plastic to reduce air leakage. The wing loadings on these gliders can be as low as one-half pound per square foot. They hang in the air like kites and come down so slowly that they are not subject to the high temperatures experienced by conventional types of reentry vehicles.

It is expected that a flight test will be made soon to prove conclusively that the metal cloth, flexible-wing glider can be used to bring a payload back from space. The payload would hang below the wing in an insulated spherical container. If these tests are successful it is probable that the flexible-wing glider will become the parachute for astronauts.

First flight tests leading up to the orbital test for the flex-wing reentry vehicle were conducted at Wallops Island, Va. by NASA. A flexible-wing model with a small payload was fired to an altitude of 200,000 feet by rocket. The model was tracked for over an hour by radar and it still hadn't landed.

A NUMBER of other uses are possible for the flexible wing, such as recovery of drones and as an auxiliary wing to allow overloaded aircraft to take off.

The history of the flexible wing is typical of many aeronautical developments. Francis M. Rogallo applied for the original patent on the idea around 1948 after several years of experimentation. He worked on the idea for another 10 years before it attracted any real interest. Once the original resistance to the idea was overcome, aeronautical engineers in many fields began finding uses for it. It seems certain that the flexible wing will become a familiar sight in the future. END

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More and more, pilots and owners wonder why they see less and less 91/96 octane gasoline. The day's not too far off when you won't see it at all. Here are a few of the many reasons why:

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AIRPORT OPERATORS are finding the resulting decreased demand for the 91/96 grade advantageous. Without 91/96 they're able to carry fewer grades of gasoline, cut inventory, and have less money tied up in stock. This lessens operating complexities and has but one disadvantage: 100/130 meets occasional buyer resistance at airports where it costs more than the 91/96.

WHAT ABOUT YOU? Remember, *any engine whose specs call for 91/96 can use 100/130 without fear of damage.* That's important, and it's backed up by reliable statistics. True, 100/130 may contain more tetraethyl lead than 91/96 and, in such cases, better spark plug maintenance might be required. But, the prop-wash about it burning up valves and causing other internal damage in lower rated engines is an old wives' tale.

If your engine is rated on 91/96 octane aviation gas, don't ever be afraid to step up to 100/130. Never, *under any circumstances,* downgrade your fuel. The consequences are detonation, a burned piston, and a dead engine.

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Sabreliner

(Continued from page 26)

the relative wind is about 10 degrees. With its engine thrust line wing/axis relationship, the Sabreliner appears to be flying nose-high most of the time.

The airplane's stall characteristics are typical of the Sabreliner's overall excellent handling qualities—there is a definite nibble as the initial buffet appears. This is followed about 10 knots lower by the actual stall-break. Like many other jet aircraft, the T-39 has to be trimmed to a very low airspeed to get a complete stall. It runs out of elevator if a stall is attempted from normal cruise trim.

Stall buffet in the Sabreliner started at approximately 85 knots IAS at 10,000 feet altitude in landing configuration. From this flight condition, at approximately 15,600 pounds' gross weight, applying full thrust enabled the T-39 to fly right out of the stall with noticeable acceleration.

While weather at EAFB was excellent for the flight work, surface winds were gusty—up to 30 knots at about 30 degrees off the runways, enough to give excellent demonstration of the Sabreliner's crosswind characteristics.

First landing with the airplane was at a gross weight approximating 15,500 pounds. Initial slow-down from the break out of the overhead pattern is with speed brakes (which can be left extended through the entire pattern and landing if desired), until gear and flap speed of 160 knots IAS is reached. The T-39 is slowed to 130 knots for base leg, 120 used on final and flare at about 110 knots. For single-engine approaches, speeds are increased on base, final and over the fence by 10 knots until landing is assured.

The Sabreliner has a pronounced nose-down trim change when flaps are extended. Simultaneous trim correction can be effected with the trim switch on the control wheel. The airplane also can be held against the trim change from zero to full flaps without too much effort should trim fail.

Yaw trim change when an engine is stop-cocked in flight at either low or cruise speed is not excessive, because the powerplants are so close to the aircraft centerline. Air restarts are simple—ignition switch is pushed in, throttle brought from cutoff to idle and gauges monitored for fuel flow, EGT, oil pressure and rpm increases. Following air restarts, the P&W J60 was brought from idle to full thrust in four seconds, a respectable short interval.

Last takeoff of the Sabreliner was made with gusts almost at the maximum allowable for the airplane, at a gross weight of about 13,000 pounds. Rotation was started at about 105 knots and the airplane became airborne about 112 knots. Airspeed was held at 180 knots IAS in a rather steep climbout. At this angle, airspeed and weight, the Sabreliner climbed to 6,000 feet in one minute 14 seconds from brake release. Climb angle at 5,500 feet was about 28 degrees while airspeed had climbed to 195 knots.

One ILS approach with a full-stop landing was made on the Edwards ILS course as a check on both the aircraft and on the new Flight Director System pilot display which the T-39 carries. The FDS is an Air Force-developed system presenting a set of zero-reader-type cross pointers supervised over the attitude indicator.

Performance of both the airplane and the display was excellent throughout a very turbulent approach, which included both crosswinds and vertical gusts. The Sabreliner, with landing gear and approach-take-off flap setting, is a very stable airplane for its weight and size. Availability of the speed brake coupled with excellent engine response makes the airplane very good for instrument approaches in turbulence.

The Sabreliner has, overall, excellent handling qualities and flight characteristics. The response rates, in combination with the controllability and maneuverability even at higher speeds, without the high degree of sensitivity of a power flight control system, leave it in a class where any competent pilot could fly it and enjoy it.

Noticeably absent is roll coupling, dutch roll or roll-due-to-yaw, a phenomenon which has been long associated with swept-wing aircraft.

T-39 SABRELINER

Performance:

Cruise speed	500 mph
Cruise altitude	above 40,000 ft.
Cruise range (extended range)	1,725 stat. mi.
Single-engine cruise altitude	20,000 ft.
Takeoff ground roll at sea level	2,730 ft.
Landing ground roll at sea level	1,580 ft.
Landing approach speed	110 mph
Touchdown speed	105 mph

Specifications:

Length	43.8 ft.
Height	16 ft.
Wing span	44.4 ft.
Tail span	17.55 ft.
Wing area	342.1 sq. ft.
Empty weight	9,307 lbs.
Fuel (1,056 gals.—extended range)	6,864 lbs.
Gross takeoff weight	17,760 lbs.
Engines (2) Pratt and Whitney J60	3,000 lbs. thrust

The airplane's aerodynamically operated leading edge slats are effective and, according to USAF, have given no problem from the beginning of the T-39 program.

Nose wheel hydraulic steering in the Sabreliner is adequate for landing rollout and taxiing in high crosswinds and gusts. The electrical engage-disengage button requires a full push to engage and another to disengage. Steering is by rudder pedals. The airplane can be adequately controlled on rollout in high crosswinds.

Visibility of the Sabreliner is excellent. More than usual window area has been included in the Sabreliner which gives pilots a wider field of vision. Eyebrow windows are also included and give excellent turn visibility.

The Sabreliner can be operated conveniently by one pilot. Cockpit layout is

(Continued on page 86)

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									Night	Instrument

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(Continued from page 84)

very well planned in this aircraft.

The hydraulic system operates the landing gear, brakes and speed brakes. Wheels can be gravity drop-locked. The flaps are electrically actuated and mechanically interconnected.

The fuel system is designed so that each engine is fed from its own integral wing tank, but a cross-feed allows either tank to supply both engines. Gravity shifts fuel from a fuselage tank into the wing tanks. Single-point pressure refueling is incorporated.

The size of the aircraft permits maintenance from the ground without ladders or stands.

Seats are installed in the T-39 so that a rapid shift can be made from passenger to cargo interior, or half cargo and half passengers.

As an aircraft to fulfill the multiple missions upon which the Air Force requirement for an off-the-shelf airplane of this size and type was predicated, the T-39 should be an excellent investment.

From all appearances, North American could change the exterior paint job on the T-39As and fly them off into the commercial market. Although it's not exactly that simple, the company has a great advantage in possessing a certificated, refined, debugged piece of hardware to demonstrate to prospective customers, along with rather firm delivery dates.

The problem of manufacturing a commercial Sabreliner is small. North American tooling makes possible a production rate of 20 aircraft per month. The Air Force is taking five T-39s per month at the peak production schedule called for in the contracts. The gap between contractual rate and capability is large enough to accommodate orders from possible additional customers such as the Navy or foreign governments, in addition to any U. S. commercial customers.

Whether or not the Sabreliner actually will become a commercial line still is to be decided. There have been many who feel that for all practical purposes the decision has been made to go ahead, but there still remains a question of corporate approval.

North American has had a group of marketing and sales people closely studying and working on the project for commercial sales for several years. Currently, the hope is to set a firm price for a commercial version of about $750,000 for the airframe minus electronic gear.

The lead time between order and delivery now stands at about 12 to 14 months. This is primarily because of engines and other long lead time vendor items rather than the airframe itself.

The company at the time of writing expects to make a decision by about July or August on whether to offer the Sabreliner commercially. This is about the time the airplane will be heading down the home stretch of the flight test program, and it will be pretty well known what expensive fixes, if any, will have to be accounted for.

If the currently prevailing trends of load factors in commercial and military business travel hold true, the Sabreliner looks good.

Based on the qualities of the airplane demonstrated in the evaluation, the odds go up considerably in its favor. END

HANGAR FLYING

CUB vs. THUNDERSTORM

I WAS CLIMBING into my J-3 Cub, ready to begin the last leg of a long cross-country, when I suddenly noticed that the sky had gone from sunny to quite dark. Clouds were boiling up to cover the clear blue sky and a light mist was beginning to fall.

The thought that popped into my mind was to take off as quickly as possible; I didn't want to be delayed. I would get out of the area before any storm really hit.

I jumped into the plane and signalled for the gasboy to spin the prop. He gave me a peculiar look, but spun the prop anyway. I opened the throttle, wheeled the Cub around and headed down the taxi strip.

I got panicky as the rain began to fall with a steady patter on the windshield. All I could think of was getting the airplane off the ground as soon as possible and heading home.

The wind was up to about 30 mph as I started down the runway. The Cub leaped off after one of the shortest takeoff runs I have ever made. By the time I got into the air, the Cub was bucking like a Model T crossing a plowed field.

The rain beat down as I climbed out of the pattern and headed south. The air was so rough I could hardly stay on course.

I looked back toward the airport. The mist and rain had closed in behind me; there was no turning back.

I had just located my first checkpoint when WHAM! . . . the Cub slammed into the center of a rain squall which was following the light rain. I hadn't seen it coming. I had time to do nothing but grab the stick and hang on.

The winds became so violent they battered the Cub to a standstill. For every foot I went forward, I went up and down six. I had practically no forward visibility; when I peered down through the swirling storm, I could see cars and trucks lined up along the shoulders of the highways. They couldn't see to drive. I wondered what class idiot that made me, trying to fly in weather that stopped ground traffic. I held on grimly as the plane lurched along. It shuddered and protested loudly with creaks and groans.

It took me about half an hour to fly through that rain squall. It seemed like half a year.

I broke out of the storm almost as suddenly as I had flown into it. The rain slacked off, turned into mist and then stopped. The airplane was in one piece and still flying.

I flew straight and level until I could control my shaking, and then searched for a landmark that would identify my position, and was soon back on course.

I decided to land along the way and top the tank. "Which way did you come in from?" the gasboy asked.

"North," I answered nonchalantly.

"Fly through some weather?" he asked, looking at my battered and sodden Cub.

"A little," I said with a sheepish grin, and then marched off to check the weather, a wiser and much subdued airman.

DON E. FINK

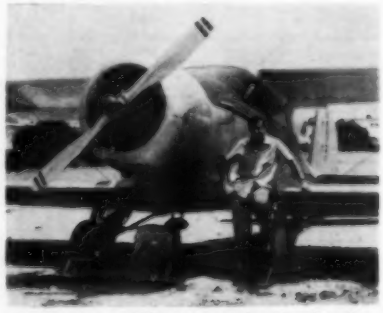
Minneapolis, Minnesota

WHAT HAPPENED TO THE OIL?

TWO HOURS OUT of Casablanca, over some of the wildest mountains in Europe, my four charter passengers and I were in trouble. My faithful Beechcraft Staggerwing had an oil pressure gage whose needle was just now settling on zero. My first reaction was to retard the throttle, the second to pull the oil bypass control, which sent the oil pressure up to nearly normal. The temporary corrective action gave me time to take stock of the situation.

We were settling into a power glide, just passing the last of the high mountains when I realized that I was cutting in the oil bypass at shorter and shorter intervals. We would never reach the emergency field.

The ground was much flatter now and ahead was a small town, shown as Alamgro on the map. I hoped that there would be a clearing close to the town. There was. It appeared to be a good field, unobstructed, and big enough for an easy landing. At closer range, I saw that the field was plowed in deep furrows with huge rocks and a wide drainage ditch across it. I pulled the oil bypass for the last time as I edged into a shallow turn to final and lowered the gear. I expected little difficulty landing with the furrows, but eight feet off the ground ready to flare out, I saw that the furrows were cross-plowed. I hauled back on the wheel, to bring all the plane's weight down on the tail. In one big bounce we cleared boulders and the drainage ditch and jolted to a stop all in one piece.



The author and his Staggerwing Beechcraft.

The oil tank was empty, but we could find no trace of leakage. The mystery of the oil loss was unsolved until I happened to check the oil company records when I returned to Casablanca. The fuel truck log revealed that the Staggerwing had been serviced with light weight oil which had vaporized and burned completely away in only two hours of flying. Now I stand by to supervise when my airplane is serviced.

WILLIAM G. POREMBA

Woodland Hills, California.

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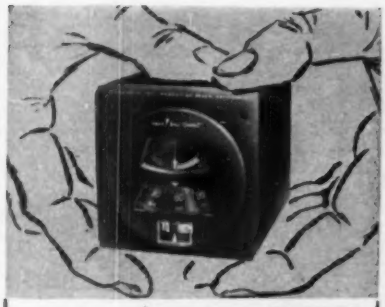

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SAAFELD SKYSKOOTER

AN UNUSUAL little autogyro, the Saafeld Skyskooter, built and flown in San Diego, Calif., is now offered for sale complete or in kit form.

Certificated in the "experimental" classification as an amateur-built aircraft, the welded-steel and fiberglass Skyskooter has a flying speed range of 25 to 85 mph, and normally cruises at 65 mph. Its service ceiling is 12,000 feet; range with 17-gallon fuel tank is 250 miles.

The rotorcraft has a takeoff roll between 50 and 300 feet with an initial rate of climb at 1,000 fpm; landing roll is zero to 20 feet. Empty weight of the diminutive autogyro is 275 pounds, takeoff gross weight is 650 pounds.

Herman A. Saafeld says that his Skyskooter kit can be assembled with no more than simple shop tools, and that prepared parts of the kit can be purchased separately. Rotor blades and mounting hub, for instance, assembled and tested, sell for $295. Complete kit, less its 72-pound, 72-hp McCullough 4318 engine, sells for $1,995; ready-to-fly Skyskooter with a new engine is priced at $3,995.

The autogyro, which can be stored in a garage, is 10 feet long, five feet six inches wide, and six feet six inches high. Rotor diameter is 21 feet.

I Learned About Flying

(Continued from page 52)

I slowed the airspeed to 100 and hit the top of the clouds at 14,300 descending 500 fpm. At 5,000 feet we were still in it and it was raining. I put down full flaps and slowed my airspeed to 85. I would let down slowly to 4,500 feet, and surely we would be on contact by then. My wife was watching for the ground, and I was watching the instruments.

At 4,500 feet we were still in the clouds. It was raining harder. I must go back up, but then what? Come back down again with less gas and beyond Amarillo? Would I break out in a hillside? Down was still the only way. I cut the airspeed to below 80. If I hit anything, I wanted to be as slow as possible.

As the altimeter dropped below 4,300 feet, my wife saw the ground for an instant. How high were we? Was it flat? Lower than the pattern back in Boise, she answered, yes. A moment later we were out again. 200 feet below us was Texas. The visibility was about a half mile, and it was raining, but it looked good to me. Our ETA to Amarillo was 10 more minutes away. There was nothing to see, and nothing to do but hold the course.

We soon saw a river to our left, it ran just a little left of our course, but would surely lead to a town. We followed the river, and soon saw a few buildings, with a water tower. It didn't take long to lose a couple hundred feet, and as we passed the tower the name "Boys Town" stood out plainly, but it was not on our maps. We still didn't know where we were.

Then through the rain a bridge appeared, which meant a highway or railroad and undoubtedly a town. I didn't care what town as long as it had a flat place to get 27 Victor's wheels on. The bridge bore a highway. We flipped a coin mentally, and turned right. Within a few minutes, it was obvious that a city was ahead. The smokestacks and TV antennas with their unseen tops in the cloud deck above me made me shudder as I thought of letting down among them in the soup. After we identified Amarillo, it was a simple matter to find the airport. The beacon and grounded airliners told me how bad the weather really was. As the wheels settled on the rain soaked pavement, we could see the pigeons walking beside the runway. I gave a sigh of relief that could have been heard in the tower.

I learned much about flying that day, all of which I should have known. I should have turned back in Salt Lake City and had the radio fixed again. I should have checked the weather at Gallup beyond Santa Fe. I should have turned back to Albuquerque when I could not land at Santa Fe or Las Vegas.

Now I have two VHF radios with omni, ADF and an auxiliary transmitter. END

Big Bad B-36

(Continued from page 39)

that I had help; and I did, but I'm not sure that he who helped, *wants* credit for it. (And a big Hello to *you*, Bob Widmer, Chief Engineer, Convair, R.F.D. 1, Ft. Worth, Texas.) So I won't say who it was. Instead, I'll refer to my accomplice as my "opposite-number."

One hot afternoon, the phone jumped off the hook; it was my "opposite-number" calling, and after the usual exchange of mutual recriminations over the latest '36 antic, we exchanged a few rumors. He had an interesting one—that the Air Force was thinking of "fizzling-out" the B-36 procurement. Since I was in the Air Force B-36 Procurement Office, naturally, I hadn't heard the rumor. But it sounded interesting. He then went on to relate something that happened only a day or so before.

It seemed that Stuart Symington, then Secretary of the Air Force, had passed through Texas on an inspection trip, and as his C-54 left Dallas, Ben Erickson—the contractor's chief test pilot—"happened" to be in a '36—also leaving Dallas for Ft. Worth, and by one of those fantastic coincidences, he "happened" to be flying right off Symington's wing-tip—on his side of the plane. The '36, again, by sheer happenstance, "happened" to be lightly-loaded, tail-up, throttles "cruising" at METO (maximum except takeoff) power—and Ben wuz poundin' leather and headed fer th' barn.

The sight of an angry B-36 galloping by, close-up, is a fearful thing, and it must have caused Symington the uttermost astonishment! He had been told, and truthfully, that the '36 wasn't the fastest airplane ever built. So when he landed at the contractor's plant at Ft. Worth, he was filled with disbelief. But his hands were soon filled with little cardboard beliefs, little performance charts that showed what the '36 could do—once they got it to fly. The cards revealed that the '36 had been a victim of wild slanders, but Symington found that the builders of the '36 were unimpressed by these slanders. They insisted that the '36 was a good airplane.

AND it *was* a good airplane—if it could be kept flying long enough, without mechanical trouble, to find out.

At any event, my "opposite-number" said they had wangled an invitation to take their proof to Washington and present their case. My "opposite-number" wondered how this might best be done. I suggested they fly a '36 and have it meet its "guaranteed" performance.

We then got serious and discussed the next best thing to do.

Now up until this time, aircraft performance had been quoted in a piecemeal and willy-nilly fashion. It was impossible to directly compare one plane with another. One B-36 had a range of 3,800 miles at 18,000 feet altitude, with 4,000 pounds of bombs, at 230 mph, on Tuesdays, Thursdays, and Saturdays. It's competitor could fly 4,600 miles at 200 feet altitude, carrying nine pounds of bombs, at 300 mph, with a "normal" tail-wind, on Mondays, Wednesdays, and Fridays.

"Range" was a mythical thing that inferred you hoisted a plane up to its best cruising altitude with a winch, turned on the engines, flew it at its best cruise-speed, and as the last drop of fuel trickled through the carburetor, you dropped a plumb bob, marked an "X" on the ground, and then measured the "range" with a tape measure. Pilots sometimes had trouble getting this "range," particularly under combat conditions.

About this time, the engineering division at Wright Field had contracted with the RAND Corp., of California, to work up a set of standard performance rules—the famous "RAND-Rules" (now a MIL spec), which allowed fuel for engine warm-up, takeoff, climb, cruise, over-the-target speeds, and five per cent take-home fuel. This led to a series of charts called "V-R Diagrams" which showed speeds vs. range for a given mission-profile.

Since I was often badgered by "higher authority" (and there was a lot of it), for '36 performance versus some other plane, I was anxious to get comparison data, for I often had to come up with a fast guess figured with a slide rule. Now, as you know, the way a project engineer works is to get someone else to do it—and this looked like a golden opportunity.

So when my "opposite-number" blurted out wonderment as to how best present the case of the '36 to Symington, I blurted

(Continued on page 90)

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(Continued from page 89)

back, "Use RAND Rules and make comparison-charts of the '36 versus the other bombers—and tell the truth!"

It was this last bit of strategy that was later to befuddle the opposition during the investigation—for telling the truth was such a novel defense in a Congressional investigation that it threw everyone off—no one ever suspected such subtle, amateurish tactics. And when they caught on—it was too late; they believed it themselves! That's what amateurs can do to you!

The kink in this suggestion was that it had long been a tradition in the Air Force that no contractor should know what a competitor's plane could do, which followed a security policy that such data should be known only to those who "had a need to know."

However, it had been an even longer tradition in the industry that a contractor *should* know what his competitor's plane could do, which also followed "a need to know," often desperately. Having been an industry boy, I knew this. (Any competent engineer can calculate the performance of a plane knowing the engine and a few basic dimensions.)

With the solemn assurance of my "opposite-number" that they'd watch their emotions when jotting down their competitor's performance, and that they'd show the results to me, we hung up, and I turned to something more important—at the time. "Now, *why* do the bomb-bay door sealing-strips fall off when in Alaska? Silicon rubber . . . Hmm."

And so this innocent little telephone conversation led to the Congressional investigation. The comparison-charts showed that the '36 "enveloped" most of the then existing, or experimental bombers on order, and that the Air Force had too many planes that could do the same thing, and none that could do what the '36 could do—when it decided to do it.

The Investigation actually ended when the Navy, to their horror, radar-tracked a '36 making an honest "10-10" flight—10,000 miles to Hawaii and back from Ft. Worth, non-stop, carrying 10,000 pounds of bombs plus full ammunition. The investigation fizzled out into a "Sez-you! Sez-me!" sort of thing, and the Air Force picked up the loose cash from the cancelled contracts of the also-rans, and dumped it into the '36 program, and we and the contractor went to work making her an honest airplane.

From then on, it was early-to-bed, early-to-rise for the '36—and no more monkey-business, and it finally got the message and straightened up and flew right. It soon revealed an amazing ability to fly high. It got up above 50,000 feet at times—a fabulous feat for a piston-plane, and with engines guaranteed for only 35,000 feet!

It became the forerunner of the U-2 high-altitude, sub-sonic, "sneaker" plane. In fact, the RB-36s, Reconnaissance-Bombers, could have done what the U-2 did later—sneak in over Russia at extreme altitude, heavy with ECM (Electronic Counter-Measure equipment), get pictures and other data, out-wit the Russian jet fighters, and get back home without getting shot down.

And who knows—maybe they *did* do just that!

END

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Highway Patrol

(Continued from page 27)

miles back . . . Where were you?"

"I was parked right here near the city limits."

The patrolman pointed to a light airplane circling overhead. "That is our airborne unit. The pilot watched your performance, radioed ahead and asked me to intercept you. Because of the heavy traffic today, he followed you in, just to make sure that I picked the right automobile."

That is the Nevada Highway Patrol's "Eyes in the Sky" program. Aerial operation is extended to many phases of the state's law enforcement activities, but its main purpose is to cut down driving accidents.

The man who makes the eyes in the sky operation tick is 35-year-old Robert F. Stenovich, Nevada's Superintendent of Highway Patrol. Mild mannered, he is ever-courteous, but sticks to a get-tough policy when dealing with reckless or drunken drivers that endanger the safety of Nevada's highways.

With approximately 5,000 miles of highways to patrol and a population of 260,000, the 110,540 square miles are patrolled around the clock with only 39 patrolmen. In spite of the excellent cooperation of city and county law enforcement agencies, providing police protection for Nevada's highways is a man-sized job and each patrolman logs about 400 miles in an 8-hour shift.

The ever increasing flow of tourists swelling the state's population on weekends and holidays and transient vehicles roaring east and west over transcontinental highways creates a real law enforcement problem for a staff no larger than that maintained by an average city precinct.

The highways in Nevada are being improved daily, with new four-lane super highways replacing the winding, narrow roads of the past. But distances are great across much of Nevada's terrain. The 446 miles along U. S. 95, between Reno and Las Vegas, make a long and tiresome drive. Likewise, the 415 miles on U. S. 40, from Reno to the Nevada-Utah line at Wendover, tax the strength of the most experienced driver. Long stretches on a straight road, vast unpopulated areas, the absence of a maximum speed law and a noticeable shortage of patrol cars often tempt the motorist to reduce his travel time by driving at fantastic speeds.

The same tourist traffic that aids so much in bolstering Nevada's economy also creates the state's greatest traffic problem.

Californians place second to Nevadans in the fatalities on Nevada's highways because of the number of golden-staters travelling to Reno and Las Vegas. During a normal traffic week in July an electric counter, placed near Carson City, averaged 10,000 vehicles a day. Visitors to the Reno area average about 25,000 persons per weekend and pose a heavy traffic problem when they start for home on Sunday evenings. Handling this requires a tremendous amount of work and it isn't possible to have 39 patrolmen at the many more than 39 places where they are needed.

Even as Stenovich accepted appointment to his new official station in 1959, he was thinking of aerial reconnaissance as a

(Continued on page 92)

the hoodless wonder

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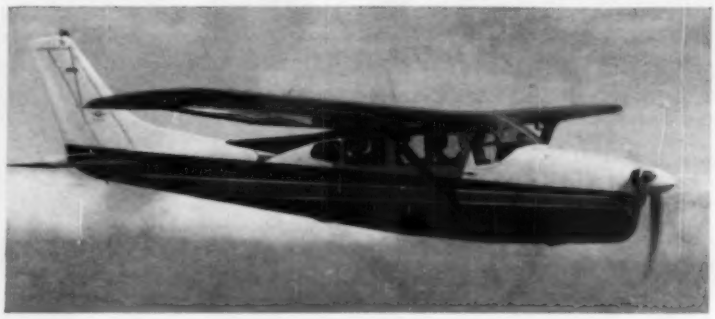

NEW CESSNA 210

CESSNA'S UNIQUE retractable landing gear 210 was flown by FLYING at the Cessna airport. Cruise, stability, and stall performance of this airplane were a revelation.

Although weather conditions precluded cruise evaluation at optimum altitude, it consistently trued out in excess of 180 mph in the lower levels. At 75 per cent power it indicated 175 mph at 4,000 feet with two degrees C outside air temperature.

The 210's "turned-in" wingtips, according to the Cessna people, are responsible for the 210's turn stability—releasing the controls in a bank will result in the airplane slowly rolling out to straight flight.

We established a 40-degree bank, and hands-off, 720 degrees later, we were again in straight and level flight—the aircraft does a remarkable job of hands-off flight.

Pitch attitude in power-on stalls is extremely steep—in excess of 60 degrees; it truly hangs on the propeller. The airspeed reads zero, and it is doubtful if the forward speed would reach 30 mph—during the entire process the ailerons retain effect but become quite sloppy. If the nose is raised to the point where the stall actually occurs, the nose will fall rather swiftly through the horizon and the right wing will invariably drop.

Powered by a Continental 10-470-E rated 260 hp at 2,625 rpm, the 210 accelerates rapidly for takeoff. Into a quartering wind of 15 knots with two on board and a half tank of fuel, it broke ground in less than 600 feet. Initial rate of climb registered over 1,500 fpm.

Visibility in flight is good but typical high-winger. "You look *before* you turn," said Hopkins as I would stretch my neck to see where I was going after the wing was down.

The interior of the 210 is in keeping with a fine executive airplane—excellent wool and metallic fabrics make up the upholstery while the floors are carpeted in deep pile wool.

The 210 instrument panel is outstanding—the flight group is directly in front of the pilot with the VOR-ILS indicator and the manifold pressure gage so close as to be a part of it thus facilitating excellent power and navigational control. Sufficient panel space is available for almost any radio combination desired by the owner commensurate to this price airplane.

The success of the 210 can be measured by the fact that in its first year of life it outsold all other aircraft in its price class.

GERALD J. SCHLAEGER

(Continued from page 91)

speedy extra arm for Nevada's Highway Patrol.

"What we need are some eyes in the sky," he said. "I want a bird's eye view of what's happening on the highways and to be able to relay the information to patrol cars." With a tight budget and a skeptical legislature, Stenovich wisely selected a light aircraft capable of operating at fewer cents per mile than his patrol cars. He chose a 135-hp Super Cub.

The Cub has a top speed of 130 mph, yet is capable of flying as slowly as 45 mph, and its sensational all-around performance convinced him this was the airplane for the job. Not only did the plane fill the bill performance-wise, but the unit could be operated by one man, leaving undisturbed the limited force that could hardly be spared from regular duties.

Obtaining the volunteer services of a professional pilot, who was also a veteran reserve member of the Nevada State Police, Stenovich launched his eyes in the sky program during the Memorial Day holiday of 1959.

Advance publicity, mild at first, gradually caught on. California newspapers and radio stations gave their public a warning. The effect was felt. Motorists glanced warily upward, accelerators were retarded, speed zones and caution signs were better observed. There were warnings, and there were citations. The low-flying plane in constant radio contact with cruising patrol cars caused occasional mutterings, but on the whole the holiday weekend went well. Many motorists returned to their homes more conscious of safe driving practices than had been the case for some time.

The successful performance of Stenovich's air arm prompted him to continue the operation from time to time during weekends and busy holidays throughout 1959 and 1960. Many miles were covered

during busy hours. More and more violations resulted in citations and warnings that would have gone unobserved without the "eyes in the sky".

Gradually the air arm's usefulness was extended. Patrolmen were directed accurately to abandoned autos, hidden from view of regularly patrolled highways. Stolen cars were recovered which may have otherwise gone unnoticed for days, or weeks or even months in Nevada's sparsely populated area.

In addition to two-way radio communications, a public address system and even a siren were installed in the airplane. Local law enforcement agencies began to call on the Highway Patrol for use of the airplane in aerial searches for escaped prisoners, lost hunters, robbery and hold-up suspects and various emergencies. By the close of 1960 the airplane had definitely established its place with the Highway Patrol.

Throughout the operation of the "eyes in the sky" Stenovich has not only endeavored to reduce the number of accidents and improve the safety of driving on Nevada's highways, but has firmly insisted on safe and cautious operation of his airborne unit. The airplane is never flown directly over moving traffic on the highways but always off to the side and never below FAA minimums. Under no circumstances is the aircraft operated in any manner that might alarm or frighten the motoring public, endanger lives or property; or fail to conform to state laws and the rules and regulations set forth by the Federal Aviation Agency.

During 1960, Stenovich was able to show a substantial reduction in fatal rural accidents and an increase in arrests and citations. Arrests were increased by approximately 300 per cent over 1959.

The Nevada Highway Patrol is still in its infancy but it has come a long way in promoting safety. With an over-all stepped-up training program and a firm get-tough policy where careless and reckless driving is concerned, Stenovich looks forward to greater accomplishments during 1961.

During 1961, an electrically operated 16mm movie camera will be installed in the airplane. The flying patrolman will record on film violations and unusual traffic problems as they occur, by merely pressing a button on the control stick.

In a traditionally friendly, western spirit, the Highway Patrol heartily welcomes all visitors to Nevada and is standing by to courteously assist the motorist in trouble. But let the driver who is tempted to violate the rules of the road be forewarned.

"Our 'eyes in the sky' program will continue," says Stenovich. "Remember someone up there will be watching you." END

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Motion Sickness

(Continued from page 50)

worsens airsickness is the sudden discovery by the pilot, crewman, or passenger that although he thought the aircraft to be in a particular attitude or position, his vision abruptly reveals that an entirely different condition exists. The resulting feeling of vertigo may bring on airsickness with considerable violence.

The position of the head is of great importance in motion sickness. When the head is upright, the symptoms can be produced five times more easily than when it is tilted backwards with the face pointed directly upward. In the latter case, the effect is the same whether the subject lies flat on his back or merely leans back and lets his head drop back further to a horizontal position.

Motions of the head, especially jarring uncontrolled movements, tend to aggravate airsickness. If the head is secured against a head rest and restraining device, the frequency of motion sickness is markedly reduced, even though the aircraft is experiencing the same degree of outside air turbulence.

In several studies, it was found that such devices could prevent 60 to 80 per cent of paratrooper trainees from becoming airsick in gliders in "normal" turbulence; also 80 to 90 per cent of those who had previously been airsick in similar turbulence no longer had the difficulty when heads were immobilized.

When all other members of combat crews were airsick, it was found that bomber pilots often remained immune, in part because of constant contact with the controls which helps the pilot to anticipate the aircraft's motion and to make his own necessary bodily adjustments to minimize airsickness.

Certain psychological factors may increase the tendency to airsickness, especially the anticipation of airsickness by an individual based on his own past experiences during flight. Other factors which seem to aggravate the condition are inadequate oxygen supply, poor ventilation, an uncomfortably warm cabin, indigestion, other illness, fatigue, hunger, overeating, alcohol, and alcoholic hangover.

At times abrupt motions may give an "elevator" sensation to the abdominal organs, as though they were being forced up into the chest, thus aggravating the symptoms of motion sickness.

Prevention of airsickness depends on certain routine precautions and upon proper use of medications.

1) Avoid long absence from flying experiences. Tendency to airsickness can be temporarily increased during such inactivity.

2) Avoid areas of turbulence whenever possible; slow the aircraft during passage through more than ordinary turbulence.

3) When possible, move to a position in the aircraft close to its center of gravity, where motion is at a minimum.

4) Banks and turns and other aircraft maneuvers should be entered and completed gently; the aircraft should not be allowed to yaw or porpoise.

5) Maintain good cabin ventilation; avoid overheating of the cabin; airsick pas-

sengers or crew should be secluded from the sight of others in the aircraft. Adequate oxygen should be available when necessary at altitude.

6) When possible, place the airsick individual flat on his back; or at least have him recline as much as possible, letting the head fall back and keeping his eyes on the ceiling.

7) Keep the head as still as possible, preferably by resting it against the back of a seat, the aircraft floor, or other fixed support.

8) Encourage the victim of airsickness to look out through the aircraft window at fixed definite objects, preferably at a distance on the ground, horizon, distant clouds, or stars; and remind him not to let the landscape or nearby clouds "swim" across his field of vision.

9) When abdominal organs are felt to move up and down with sickening effect, they can be compressed efficiently and controlled by taking a deep breath and holding it during periods when the aircraft is felt to strike a downdraft suddenly.

10) Introduce the fledgling student-pilot to all aircraft maneuvers and motions slowly.

11) Use motion sickness preventive drugs properly. These medications are very effective, but the conditions of their use may not be simple. They work best when taken one hour before takeoff. The two chief problems with such medication taken by mouth are the difficulty of giving them to an ill person who is already nauseated or vomiting; and secondly, the difficulties arising from the side effects of such drugs.

All of them tend to cause drowsiness eventually and some depression of brain functions, to varying degrees in different persons.

In general, the greater the protection against motion sickness, the more prominent the side effects. Thus, diphenhydramine (Dramamine) in a dose of 100 milligrams has proved 70 per cent effective against airsickness, though producing drowsiness in 10 per cent of subjects; while half that dose (50 milligrams) is only 52 per cent effective, and causes drowsiness in only three per cent of subjects, however. The longer and more frequently the medication is taken during a flight, the greater the side effects.

Careful studies have shown that most motion sickness preventive drugs cause a greater temporary deterioration of navigation skills, than of the muscular coordination needed for pilotage alone.

Among the most efficient medications are hyoscine, diphenhydramine (Dramamine), meclizene (Bonamine), cyclizine (Marezine), and promethazine (Phenergan). In general, a single dose of hyoscine 0.65 milligrams is considered the safest, most effective medication with the least side effects for the pilot-navigator who must continue to function at the controls of an aircraft. However, no flight which causes motion sickness in the pilot should be continued so long that repeated doses of hyoscine are needed, because it can cause blurring of vision and other unpleasant side effects eventually.

Barbiturates for motion are not safe for

(Continued on page 96)

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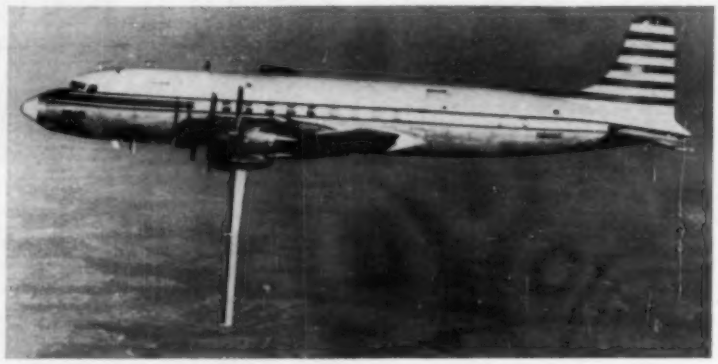

AIRBORNE EDUCATIONAL TV

A STRANGE-LOOKING DC-6A/B aircraft, with a 24-foot-long television antenna mast extending down from its forward fuselage, has begun to serve as a flying platform for a bold new educational experiment.

Video tape programs have been telecast from the airplane to a viewing audience which is expected to eventually include five million students in 13,000 schools and colleges in six midwestern states.

On its first trial in May 1961, the airborne television station beamed lessons in science, biology, French, Spanish, music, arithmetic, algebra, history and geography over two channels to an estimated 500,000 school children within a 250-mile radius of the DC-6A/B's holding-transmitting pattern. Reception in the six-state area was reported excellent.

The Purdue Aeronautics Corporation, with headquarters at Purdue University Airport, West Lafayette, Ind., owns two of the modified DC-6A/B's which will be used in the Midwest program.

The hydraulically operated antenna mast retracts against the lower fuselage for landing.

Flight tests of the modified airplanes were conducted at Friendship International Airport, Baltimore, Md., where the television transmitting systems were installed by Westinghouse Electric Corporation.

It was Westinghouse engineers who developed the concept of blanketing an entire region with television programs transmitted from a high-altitude airplane. In their "stratovision" experiments from a modified B-29 in 1948, before the installation of cross-country TV cables, a flying television station retelecast the Republican national convention from Philadelphia to viewers as far west as Michigan.

Ultimately, it is hoped, it will be possible to telecast as many as 72 half-hour lessons from the aircraft during a school day. Video tape presentations will be supplemented with live telecasts originating in the Purdue TV studios.

Purdue Aeronautics Corporation officials have predicted that, with a spare aircraft to meet weather and maintenance contingencies, the telecasting aircraft can be on schedule at least 98 per cent of the time.

Estimated coverage from the flying TV station includes a 300 to 500 miles in diameter, and covering Milwaukee, Chicago, Detroit, Cincinnati and Louisville.

The first full academic year in which the DC-6A/B will be an "assistant professor" will begin Sept. 11, 1961, and continue to May 24, 1962.

The airborne TV project is sponsored largely by the Ford Foundation, which is contributing $4,500,000, with help from various industries throughout the country.

Available for service is a top faculty which will provide a broad curriculum to a large number of students, both in rural and urban areas, and ranging from first graders in elementary schools to college and university seniors.

The project is an attempt to cope with the national problem of providing high-quality education for America's rapidly expanding school population. The high-flying airplane will play a key role in the venture.

PAUL N. JANES

(Continued from page 95)

the pilot because of depression of brain functions; they may be useful for passengers, however.

The use of such medications by the pilot very often involves a difficult decision, one that cannot be forced to follow arbitrary rules. The distressing effects of motion sickness itself may be much worse than the side effects of the medication used. Each individual should be thoroughly familiar with the effects of a medication upon himself personally, before using it during flight operations.

Never take an unfamiliar medication for the first time within six hours before take-off.

When the pilot's airsickness distress leads to doubt and indecision, he should remember one rule—cancel the balance of the flight plan and set 'er down. Terra firma is the best cure for motion sickness. END

El Paso

(Continued from page 41)

port to the area missile training operations, aircraft sweep over the McGregor Firing Range early each morning at low altitude to make sure no unauthorized aircraft are in the area before firing starts.

A large number of corporate aircraft are based at International, including the fleet of El Paso Natural Gas Co., which flies all over the southwest. The company flies everything from light photography and survey craft up through heavy twins in its operations.

THE story of this particular business fleet is another one of faith and farsightedness. Swede Johnsen, in charge of the aviation operations for the company, was a pipeline worker for EPNG before the war, and did his stint overseas as a pilot.

He became convinced that airplanes were the answer to the gas company's transportation problems and staged a running barrage of mail to his bosses back home telling them so. After the war ended, Swede started the company's aviation operations with one plane and himself as pilot.

Company officials quickly saw the benefits of flying, and today the fleet is quite justifiably considered one of the finest in the nation.

Sharing a big new hangar with EPNG is a different operation, but an important one. It is the flight headquarters of a Norair/Radioplane team. Their job is to air-launch RP-76 rocket targets over McGregor Range for Army missilemen to shoot at.

The operation is composed of four pilots and eight modified Northrop F-89s which are used to fly the RP-76s to the range. There they are launched and then controlled from a ground tracking and control station in the Sacramento Mountains.

Last, but certainly not least, are the fixed base operators who are showing the southwest that aviation is not only there to stay but is destined to become one of the most important single factors in the future economic growth of this relatively isolated country.

Wayne Champney, owner of Champs Aviation, started there a little over ten years ago with one airplane and boundless enthusiasm and faith. Today he is the nation's top Cessna distributor. He also has branches of Champs Aviation in El Paso, Lubbock and Midland.

He began selling airplanes by getting up every morning with the sun and flying all over the southwest, dropping in on ranchers, farmers and businessmen, trying to convince them they could use an airplane in their business. He never stopped.

Next door to Champs is Southwest Air Rangers, Piper dealer, and another famous fixed-base operation in the southwest. Owned by the four Mueller brothers, Bill, Al, Dan and Joe, this operation also started from scratch and saw some lean years. But faith and hard work and the logic of flying as a means of fast, safe transportation have paid off handsomely for them.

Today they have branches in Midland-Odessa, in Chihuahua City, Mexico and in New Mexico.

Instruction, sales and maintenance of airplanes is their business.

A strong chamber of commerce, mayor and city council and an airport board are solidly behind the aviation industry and they all are working enthusiastically to make it bigger and better.

A big airport expansion program is underway at International, which already boasts an 11,000-foot runway and newly remodeled terminal facilities.

Another facet in general aviation circles is the El Paso Aviation Assn., formed about a year ago by a group of private and business plane pilots to promote flying.

Today the membership is around 150 people who are dedicated to both the love of flying and also in securing better legislation for pilots.

Several times a year they fly en masse to a popular resort in Arizona for a weekend of flying and fun.

EL PASO and the Southwest are looking into the skies more and more. The people have been released from the hardships of surface travel over the burning deserts and mountains.

Now they soar by the thousands over the land that was once ruled by the arrogant conquistadors, who, with their dreams of great treasure, never dreamed of the freedom and wealth the airplane would bring to this country. END

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ATC CLEARS: This newest Aero-Progress recording has met with outstanding success! Produced at the request of countless pilots, this record exposes you to 45-minutes of ATC Clearances and the use of the Morse Code. Electronically produced, it contains seven complete Morse Code lessons that are recorded in a manner that makes learning very easy and at the same time pleasurable. The reverse side gives 25 minutes of ATC Clearances, progressing from the simple to the complex. Included with the album is an IFR chart with space to permit working each clearance and a complete guide to ATC shorthand. A printed copy of each Morse Code lesson is also included.

BUSTER B-T: This is a little novelty record, 33⅓ rpm, extended play, that just had to be made. From the book, "Buster B-T", Aero-Progress has made an adventure-filled record that gives an airplane "life". "Buster B-T" has adventures on the ground and in the air and meets and talks to 25 different types of planes. These planes come to life and assume character. You hear "Buster" talk to a pogo plane, a jet, a flying boat and 22 other types of planes. It's exciting! Narrated by Larry Harmon, the voice of Bozo the Clown, this wonderful record is welcome in any household. A 24-page beautifully illustrated, full color story book is available at $1.00

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Garwin Instruments

(Continued from page 46)

Clocks have been placed in every nook and cranny of the panel; some pilots use wrist watches and chronographs but these can be a nuisance.

The turn indicator is the primary bank instrument on the instrument panel today. It alone can tell if you are making a standard rate turn--what better place for the clock? The turn indicator offered by Garwin is novel; at first you wonder why they went to the trouble, but a short session of timed turns and other timed maneuvers confirms its value. The clock is mounted directly in the turn indicator; you cannot miss timing here and the bonus is one less instrument on the panel. It will be available in any power combination: electric-electric, electric-vacuum, mechanical-electric, and mechanical-vacuum. Component parts are individually repairable. Cost of the electric-vacuum is $135.

The Garwin directional gyro is of disc type, it has a large aircraft imprinted on the face to act as the index and to impress the VFR concept. It is vacuum-driven but electric models will be available. Price is not yet established but should be less than $500.

The disc type direction instrument is not a new concept; it is widely used in RMI systems and as master indicators in gyro compass systems--it is mentioned here because Garwin's gyro is a step in the right direction for standardized presentation.

The instrument group evaluated was installed in the right panel of a Beech 18 for demonstration purposes. N50510 was flown from MacArthur Field on Long Island; surface winds were southwest at 10 knots; temperature was 43 degrees F.

The pictorial aspect of the attitude gyro aided attitude interpretation during the various maneuvers performed. There is a definite difference in background and just a glance gives a clear picture of aircraft attitude. After a short period of re-learning the responses of the Beech (it had been nearly three years since I had flown this model) we tried some medium and steep turns. There is a small red circle imprinted on the center of the horizon bar which greatly improves pitch adjustment, particularly in turns.

Properly set for level flight, the white dot of the miniature airplane will completely cover the red circle--if you see red, you are off the proper attitude. Of course, in-flight adjustment is an almost constant process but the red circle did permit extremely accurate changes. We were able to hold our altitude within 20 feet in banks up to 60 degrees without the benefit of the vertical speed indicator; it was on the left panel and too far away for effective use.

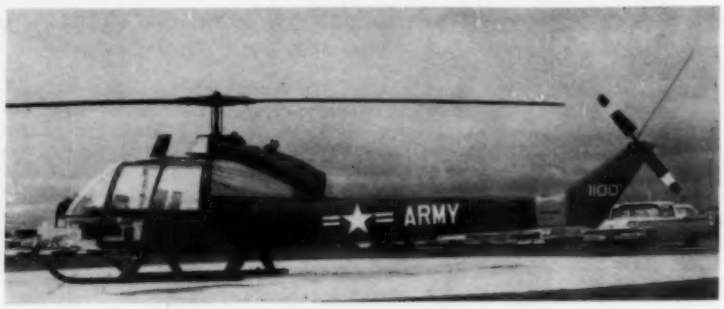
Two ILS were flown on the MacArthur system with a quartering tailwind of fair proportions; it was necessary to hold an 800 fpm rate of descent to maintain position on the glide slope at 130 mph IAS. The wind reduced drastically below 400 feet above the ground, necessitating very rapid corrections to stay on course and on the glide slope on reaching that level. The fact that the vertical speed and ILS indicators were both on the left panel of this airplane spread the cross-check to a ridiculous degree--it brought home the importance of proper instrument placement if precision flying is to be accomplished.

Garwin instruments are present on many new aircraft; among the better known is the fuel pressure gauge for the 260-hp Continental fuel-injection engines. Also the red-line computer airspeed indicator used on the Cessna Skyhook is of Garwin origin.

Complete instrument panels are furnished to Beech and Cessna for installation in new production aircraft. The Pictorial Attitude Gyro and Clock-Turn indicator are earmarked to become standard equipment on many 1962 aircraft.

Under development at Garwin is an instantaneous vertical speed indicator which will list for less than $500 and a true airspeed indicator for less than $200.

Garwin feels that the combined stress of the FAA and business flying on IFR capabilities of the private and commercial pilots will insure wide acceptance of their philosophy and product. END



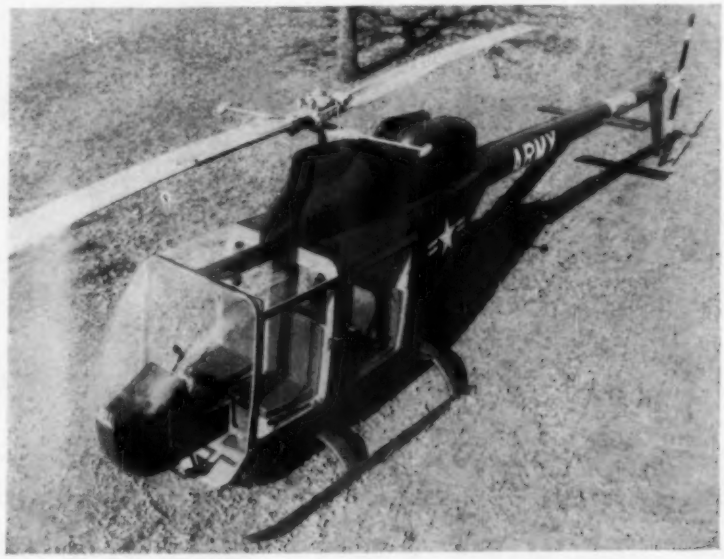
ARMY COMPETITION FINALISTS

AFTER STIFF COMPETITION to determine which company will produce the Army's Light Observation Helicopter (LOH), two of the 12 competitors, Hiller Aircraft Company and Bell Helicopter Company, have been given the go-ahead to produce prototypes for evaluation.

The Army specifications called for a lightweight, single-rotor, four-place helicopter powered by one Allison T-63 turbine engine. It must be able to carry a 400-pound load in addition to the pilot and fuel, yet cruise at 126 mph (some 60 per cent faster than present conventional Army helicopters). The rotorcraft (mock-ups are shown here) were selected from a total of 19 proposals.

The winning designs, Hiller's Model 1100 *(above)* and Bell's D-250 *(below)*, will be evaluated through a user-test program by the Army Aviation Board, Fort Rucker, Ala.; about seven test models of each design will be built. After the final decision between the two helicopters is made, the winning company will produce more than 4,000 LOHs in the largest manned aircraft procurement since the end of WW II. The LOH will replace both the present Army observation helicopters and their fixed-wing counterpart, the Cessna L-19 Birddog.

LOH production will begin around 1963 and deployment to troops will be made by 1965. Some 30 of the helicopters will go to each Army division, and there is a possibility of assigning an additional 14 in each division as an integral Air Cavalry Group (FLYING, April '61).



FLYING CALENDAR

July 1-4—Fly-in Bar-B-Q, air show, caves trip, Sportsmen's Ranch Club, Darel Gifft, Rt. 1, Box 314, Cave Jct., Ore.

July 2—Greenwood Lake Airport, West Milford, N. J., air show, stunt flying, antique aircraft, sky-diving.

July 8-12—All Women's Transcontinental Air Race, San Diego, Calif., to Atlantic City, N. J.

July 9—Fly-in breakfast, dedication of the new Creston, Iowa, municipal airport. Rain date July 16.

July 16—Navy Blue Angels, parachute team, fly-in breakfast, SAC band and drill team, military and civil displays, Mason City, Iowa, Aviation Day, Mason City Airport.

July 16—Sturgis, Kentucky, Air Show, Municipal Airport. Sky-diving, antique and experimental aircraft fly-in, military display.

July 17—Air Force Contract Aviation Services Symposium sponsored by National Aeronautical Services Assn., Hotel Washington, Washington, D. C. USAF contracting methods will be covered.

July 22-23—Elmira, N. Y., Jaycee Air Show, Antique, experimental fly-in, sky-diving, military display.

July 23—Angola, Indiana, chicken Bar-B-Q, Tri-State Airport, 11 a.m. to 3 p.m., dedication of new runway at 1 p.m.

July 23—Iowa City Air Show, Municipal Airport, fly-in breakfast, military fly-by, National Guard helicopter flying demonstration.

July 25-Aug. 10—International Aviation Exhibition with Chicago International Trade Fair, Chicago Exposition Hall.

July 30—Kokomo, Indiana, Municipal Airport, fly-in breakfast, Kokomo Pilots Club, 7:30 a.m. to noon.

August 1-10—U. S. National Soaring Championships, Wichita, Kans., Municipal Airport. Sponsored by Wichita Chamber of Commerce, conducted by Kansas Soaring Assn. Contact H. Marshall Claybourn, contest director, 8034 Levitt, Wichita.

August 3-6—North Central States Airport Managers Conference, Mason City, Iowa. Open to airport managers, federal and state aviation officials. Includes Iowa, Illinois, Wisconsin, Minnesota, Nebraska, North and South Dakota.

August 5-6—Michigan Flying Farmers annual meeting, Reed City, Miller Field.

August 6—Hartford City, Indiana, fly-in breakfast, Hartford City Airport, sponsored by Hartford City Jaycees.

August 10-14—Flying Farmers Fishing Tour to East Trout Lake, Saskatchewan, Canada. Contact Henry H. Hoffman, East Trout Lake Lodge, Molanosa, Saskatchewan.

August 13—Watervliet, Michigan, fly-in breakfast. Homebuilt and experimental aircraft invited, prizes. Brantly B-2 helicopter demonstration.

August 20—Sky Manor Airport, Pittstown, N. J., fly-in Bar-B-Q, sponsored by Sky Manor Sq., Civil Air Patrol, noon to 6 p.m.

Calendar items must be received by FLYING's editorial office, 1 Park Avenue, New York 16, N. Y., two months prior to the event.

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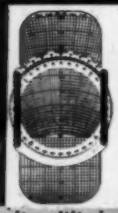

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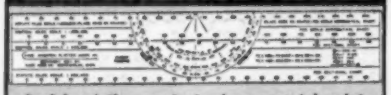

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SENTRIES OF THE SKIES

SECLUDED on the fifth floor of an unobtrusive-looking building in downtown Kansas City, Mo., is one of the most vital cogs in the military air safety of the United States. The seemingly routine atmosphere belies its importance, for it is in around-the-clock world contact with American bases.

This is the home of the Central Air Reservation Facility, or CARF, as it is more commonly known. A unit of the Federal Aviation Agency, it provides the only function of its kind in the world—to reserve certain altitudes for military flights and thus lessen the chances of air collisions.

CARF is a familiar name to the Strategic Air Command. A base in far off Spain, for instance, may be planning a high-altitude long-range flight that will take the planes over the United States. After the flight plan has been made, it is sent to CARF where it is checked against existing flight plans. If there is a conflict, then a priority plan determines which flight takes precedence, and the necessary changes are made.

If there is no conflict, approval is sent, and traffic control centers on the route are notified. The traffic control centers then adjust flight plans in their areas to permit clear passage for the flight, perhaps rerouting other traffic.

The CARF control room contains 13 plotting boards with maps. On each map are traced the routes of flights already approved, with time, altitude, direction and other data about the flight.

Five of the 13 boards are used for the current week and five more for the following weeks so the facility may keep two weeks ahead.

CARF's territory includes the oceanic areas of Seattle and Oakland in the Pacific and extends to the areas of Honolulu, Midway and Adak, Alaska. On the Atlantic side, the oceanic areas of New Orleans, Miami, New York, San Juan and Bermuda are included, extending to Gander, Azores and Shannon-Prestwick areas.

CARF is notified of flights originating from outside its area, and if no flight problem exists, an approval is given. A similar arrangement exists with the overseas areas regarding flights starting in the CARF area. The office handles all requests involving flights above 15,000 feet east of the 100th meridian and above 24,000 feet west of the line as well as in the oceanic control areas.

Mission requests are sent in by teletype or mail, depending on the date of the flight. If it is scheduled within two weeks, it is immediately checked with other flights and plotted. If the flight is for a date beyond the two-week period, it is filed until a map becomes available for that day.

One of the more obvious problems that CARF has to consider is the steadily increasing commercial jet travel at high altitude. To provide for sufficient air space for civil jets, CARF makes periodic studies of all the airlines' jet flights. This includes the amount of traffic, times and routes.

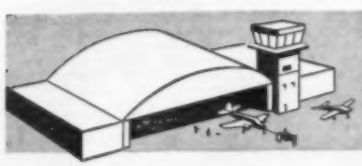
CARF evaluates this information and records on the maps the times, altitudes and routes of the most heavily-traveled jet traffic. If a military mission is filed that interferes with the commercial schedule an attempt is usually made to get the military to adjust its plan.

CARF operates on a comprehensive priority system that is divided into categories and priorities depending on imminent or actual war conditions.

About 75 per cent of all the mission requests have to be juggled to avoid conflicts with missions already planned. A typical day may find an operator talking to bases in Hawaii, Alaska, England, Spain or North Africa to eliminate conflicts.

Service is provided by CARF to the SAC, Tactical Air Command, Air Defense Command, U. S. Navy, presidential and vice-presidential flights, and occasionally the Royal Canadian Air Force. SAC is by far the heaviest user with more than 90 per cent of the requests.

DONALD J. SORRENSEN



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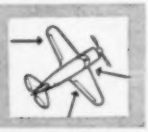

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ADULT Party Record and Catalog: $1.00. DRC—11024 Magnolia, No. Hollywood, California.

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BRIEFINGS...

(Continued from page 10)

long forecaster-to-pilot test to further improve air safety by making available to airborne pilots more complete and up-to-date weather data. Radio frequency 122.6 has been assigned by the FCC for the project. During the test, weather briefing service will be available to any requesting pilot in the areas covered by the Washington, D. C. and Kansas City ARTCC.

Doyn Aircraft, Inc., Wichita, Kan., has released performance and price information on its 1961 Cessna 172 conversion, which incorporates a 180-hp Lycoming engine and constant-speed propeller. Cruising speed at 6,500 feet, with 75 per cent power, 155 mph; takeoff run, 400 feet; rate of climb now 1,100 fpm, and service ceiling raised to 19,000 feet. All figures are gross weight. However, with full fuel and two persons, takeoff run with flaps is 200 feet. Price is $13,490. Conversion kits are also available to present Cessna 170-172 owners; and FAA approval is expected shortly for Model 175 conversion.

Under the seal of the Aviation Quality Council, Pacific Airmotive of Burbank, Calif. and subsidiary Mid-Continent Airmotive, some weeks ago, jointly launched a major campaign to eliminate bogus parts and jerry-built service on private and business aircraft. The program, endorsed initially by all leading aircraft equipment manufacturers,

is gaining increasing response from parts suppliers and service organizations throughout the western half of the U. S. Over 50 approved companies now display the Council's blue, gold and white emblem certifying "Quality Aviation Products and Services."

Coveted first takeoff positions in the upcoming "Powder Puff" transcontinental air race are held by two California pilots. Mrs. Elizabeth Humble (*left*), of Arcadia, drew No. 2 position and, with Shirley Gilmore as copilot, will fly a Cessna 172 Skyhawk. Mrs. Virginia Graham (*right*) of Sierra

Madre, drew the No. 1 slot and will fly her Piper Apache with Virginia Hall in the copilot seat. More than 90 planes are expected to be in line when the derby takes off July 8 from Montgomery Field, San Diego, bound for Atlantic City, N. J.

New Fixed Base operation and Cessna dealership has opened at Halifax Int'l. Airport Nova Scotia, under the name of Granair Ltd. Headed by Ron and Chris Graneek, the company offers all phases of private and business flying; flight training, rental, charter, aerial photography, contract flying and sight-seeing tours. The firm's fleet initially consists of five single-engine aircraft and two twin-engine Piper Apaches, plus all current Cessna models.

Holiday Inns of America, Inc., of Memphis, Tenn., does not mark its 10th anniversary in the building and operating of motels for another year, yet from a start of one Inn at Memphis in 1952, there are currently 185 Inns in operation over the nation; 47 more under construction and another 106 on the

drawing boards. Though basically highway hostels, 60 to 70 per cent of the Inns are located on or near airports, with free ground transportation provided to and from airports where feasible. An aviation-minded company, Holiday Inns owns an Aero Commander 500, a DC-3 and two single-engine Cessnas. Eight of its officers including Kemmon Wilson, board chairman, are pilots, and three others are currently working toward licenses.

Quality service for Beechcraft owners is the purpose of a training program recently established by Beech Aircraft, whereby service personnel of the company's distributor and dealer organizations are certi-

fied as "master mechanic" or "specialist technician." Those who complete the prescribed program wear identification shoulder patch as does Clarence DeWitt here, airframe specialist at United Airplane Sales, Beechcraft distributor in Wichita.

Skycraft Design, Inc., Mercer County Airport, Trenton, N. J. has received FAA approval for metal recovering of the Bellanca Cruisaire fuselage and wings of the Piper Super Cub. Approval later in the year is also expected on metallized ailerons and fuselage for the Cub.

Kaman Skymotive, new division of the Kaman Aircraft Corp., of Bloomfield, Conn., has been established to carry out the company's program as a fixed base operator of Bradley Field (Hartford) for the State of Connecticut. W. R. (Russ) Miller of Simsbury will be responsible for the program, which includes a wide range of services for the general aviation business in the area.

Special Guests receive a welcome from Igor I. Sikorsky as they arrive at the Sikorsky plant in Stratford for a flight demonstration, and a hand at the controls, of a Sikorsky S-62 helicopter. The ladies, all members of the "Whirly Girls," international organization of women helicopter pilots, are *(left to right)*: Mrs. Teddy Kenyon, Old Lyme, Conn.; Miss Jean Howard, Washington, D. C.; Mrs. Jean Wilson,

Lansdale, Pa.; Mrs. Charlotte Kelley, Scituate, Mass.; Mrs. Edward S. Carter, Fairfield, Conn.; Miss Hanna Reitsch of Frankfort, Germany; Sikorsky. Top to bottom on stairs: Mrs. Jane Hart, Washington, D. C.; Miss Ellen Gilmour, Miami, Fla., and Mrs. Barbara Kiernan, Boston.

Insul-8-Corp. of San Carlos, Calif., has organized a new aviation division and is now engaged with the Super-V Aircraft Corp. of San Francisco Int'l. Airport in the production of the Super-V twin-engine conversion of the single-engine Beech Bonanza. Under the new setup Super-V conversion centers operate under franchise from the Super-V Corp., which in turn obtains all parts but engines from Insul-8-Corp.'s aviation division. Principal partners in the reorganized Super-V Aircraft Corp. are Louis Benoist, Tirey L. Ford, and Edward T. Haas. Ford, president of Insul-8-Corp., is also president of Super-V.

Home in Worland, Wyo., for a spring vacation from his pre-law studies at Colorado University at Boulder, Louis L. Walrath, decided to learn what he could about flying in that short time. His dad, Howard Walrath, owned a Cessna 182 but was not covered by insurance for student instruction.

Frank Salsbury, flight service operator at Worland airport, instructed Louis in his Cessna 150; soloed him the first day after 4.45 hours of dual. Four days later Student Pilot Walrath went back to college with 22:45 hours in his log and checked out in the Cessna 150, 172, 175 and 182.

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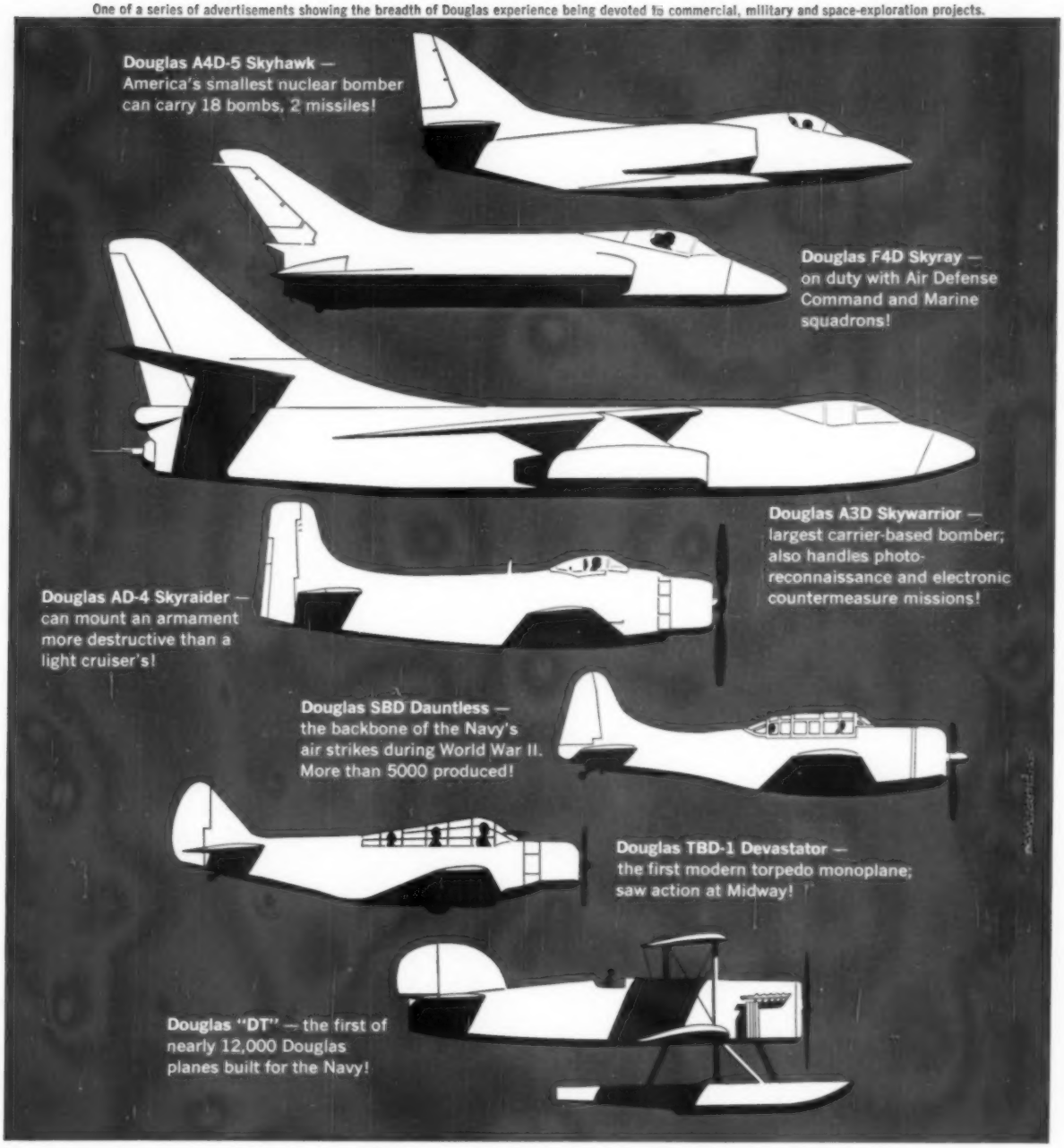
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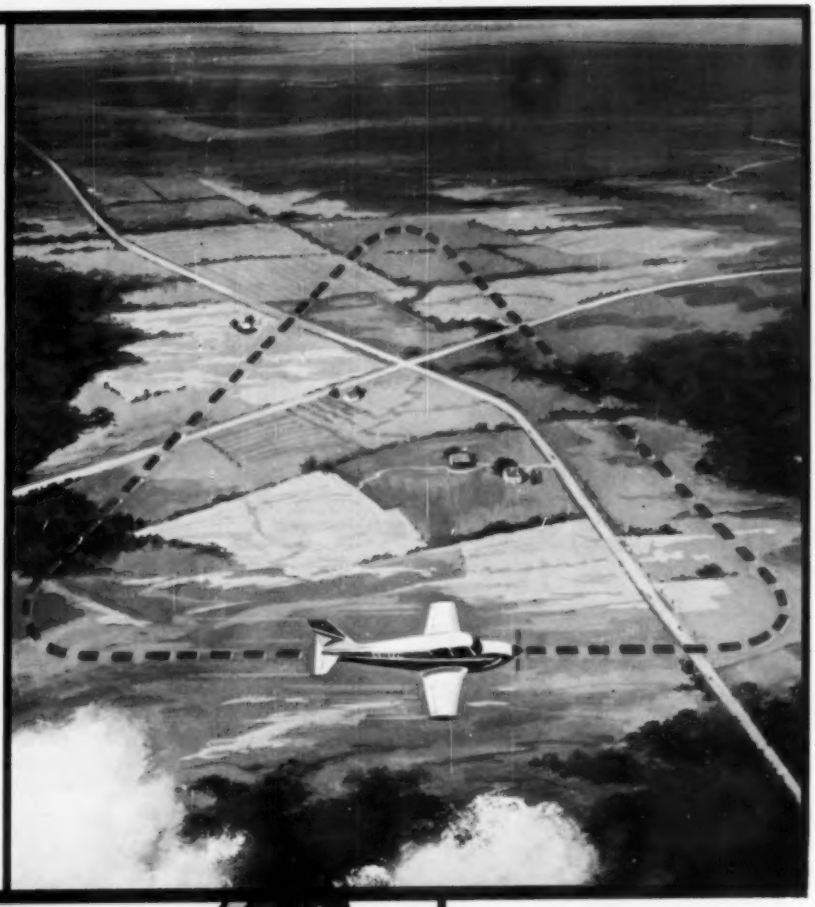
WING TIPS

WHEN LOST IN FLIGHT —EMERGENCY PROCEDURE

If you're ever lost, here's what to do: WITH RADIO CONTACT: Tune to emergency frequency 121.5 mc. Fly a triangular pattern to the right in 2 minute legs with 1½° per second turns of 120°. Complete a minimum of two patterns before resuming course. If radar contact is established, instructions will be given on 121.5 mc. NO RADIO CONTACT: Fly a triangular pattern to the left in the manner described above. If radar contact is established, a Search & Rescue plane will be dispatched for interception. Resumption of course will not compromise this system as your plane will continue to be tracked as "distressed" from the point of initial radar contact. If possible, repeat the procedure each 20 minutes until instructions are received or interception by Air Rescue Service is accomplished.



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Esso Aviation Gasoline and Oils are specially-formulated to give your engine full-power performance. The extremely low lead content in Esso Aviation Gasoline helps keep harmful deposits and spark plug fouling to a minimum. Esso Aviation Oils provide excellent high temperature stability; also help prevent carbon formation. Next time you're touching down, make your approach at the Esso sign.

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